REPORT OF THE BOARD

ON BEHALF OF

UNITED STATES EXECUTIVE DEPARTMENTS

AT THE

INTERNATIONAL EXHIBITION,

HELD AT

PHILADELPHIA, PA., 1876,

UNDER ACTS OF CONGRESS OF MARCH 3, 1875, AND MAY 1, 1876.

IN TWO VOLUMES.

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INTERNATIONAL EXHIBITION OF 1876.

CATALOGUE

OF THE

ARTICLES AND OBJECTS EXHIBITED BY THE UNITED STATES
NAVY DEPARTMENT IN THE UNITED STATES GOVERNMENT
BUILDING, FAIRMOUNT PARK, PHILADELPHIA, PA.

NAVY DEPARTMENT

AT THE

INTERNATIONAL EXHIBITION OF 1876.

HON. GEORGE M. ROBESON,
SECRETARY OF THE NAVY.

REAR-ADMIRAL THORNTON A. JENKINS,
UNITED STATES NAVY,
REPRESENTATIVE OF THE NAVY DEPARTMENT AT THE INTERNATIONAL EXHIBITION OF 1876.

LIST OF THE OFFICERS

ATTACHED TO THE NAVAL BRANCH OF THE INTERNATIONAL EXHIBITION OF 1876 AT THE UNITED STATES GOVERNMENT BUILDING, FAIRMOUNT PARK, PHILADELPHIA, PA.

REAR-ADMIRAL THORNTON A. JENKINS,
UNITED STATES NAVY,
REPRESENTATIVE OF THE NAVY DEPARTMENT.

MEDICAL DIRECTOR JOSEPH WILSON,
UNITED STATES NAVY.

LIEUTENANT-COMMANDER FREDERICK PEARSON,
UNITED STATES NAVY.

PAYMASTER FRANK H. ARMS,
UNITED STATES NAVY.

LIEUTENANT CHARLES M. THOMAS,
UNITED STATES NAVY.

LIEUTENANT RICHARD GRAHAM DAVENPORT,
UNITED STATES NAVY,
AID TO REAR-ADMIRAL JENKINS.

PASSED ASSISTANT ENGINEER JAMES W. HOLLIHAN,
UNITED STATES NAVY.

ACTING PASSED ASSISTANT SURGEON F. V. GREENE,
UNITED STATES NAVY.

GUNNER MOSES K. HENDERSON,
UNITED STATES NAVY.

SERGEANT JAMES BRENNAN,
UNITED STATES MARINE CORPS,
IN COMMAND OF THE UNITED STATES MARINE GUARD AT THE UNITED STATES GOVERNMENT BUILDING.

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THE NAVY DEPARTMENT.

CATALOGUE OF THE UNITED STATES NAVY DEPARTMENT.

BUREAU OF ORDNANCE.

Capt. WILLIAM N. JEFFERS, *Chief of Bureau.*

SECTION I.—NAVAL ORDNANCE.

CLASS A.—HEAVY ORDNANCE.

1. Fac-simile of a "Monitor" revolving turret, with two XV-inch guns inside, one on an Eads' steam carriage and the other on an Ericsson's carriage, complete.
2. XI-inch smooth-bored gun on wood pivot carriage.
3. XI-inch smooth-bored gun on Monitor iron carriage.
4. IX-inch smooth-bored broadside gun on iron carriage.
5. VIII-inch smooth-bored broadside gun on iron carriage.
6. 32-pdr. smooth-bored gun on iron carriage.
7. 100-pdr. rifled gun on Ericsson's iron carriage and slide.
8. 60-pdr. rifled gun on wooden Marsilly carriage, with directing bar.
9. 32-pdr. smooth-bored gun on skids (1827).
10. Rifled "Moody" gun on skids.
11. Rifled "Cochrane" breech-loading gun on skids.
12. 3½-inch carronade (old).
13. Swivel gun, for mounting on ships' gunwales and in ships' tops, on skids.
14. XI-inch shell gun converted into an VIII-inch rifle, lined with wrought-iron tube and jacket. Twist uniform: one turn in 40 feet; 15 grooves and lands each 0.83772 inch wide. Grooves 0.075-inch deep.

14*a*. Treadwell's 32-pdr. steel gun mounted on its wooden carriage.

15. Grice's wooden gun carriage.
16. IX-inch carriage and slide (Ward's).
17. 12-pdr. boat carriage.

CLASS B.—HOWITZERS, GATLING GUNS, ETC.

1. 20-pdr. rifled bronze gun on a wooden carriage.
2. 24-pdr. smooth-bored howitzer on a boat carriage.
3. 3-inch wedge-breech breech-loading rifled gun (1874).
4. 3-inch screw-breech breech-loading rifled gun.
5. Long Gatling gun.
6. 12-pdr. boat-howitzer (light).
7. 12-pdr. boat-howitzer (heavy).
8. 12-pdr. rifled howitzer (heavy).
9. "Nugent" gun.
10. De Brame's revolving gun, patented July 2, 1861.

11*a* and 11*b*. Small Spanish guns cast about 1490, brought to America and used by Cortez in the conquest of Mexico.

12. Billinghurst battery.
13. Floyd's rifled breech-loader.
14. Small iron carronade (old).
15. Small iron carronade (old).
16. Screw-breech breech-loading rifled steel howitzer.
17. Short Gatling gun.
18. Light 12-pdr. smooth-bored howitzer on boat carriage.

SECTION I.—NAVAL ORDNANCE—Continued.

CLASS C.—SMALL ARMS.

1. U. S. flint-lock musket (1810).
2. Harper's Ferry rifle (1815).
3. Virginia musket, flint-lock (1816).
4. Virginia musket, percussion lock (1818).
5. Smooth-bored flint-lock musket (Richmond, Va.).
6. U. S. flint-lock musket (1812).
7. Virginia musket, percussion lock (1818).
8. Springfield flint-lock musket (1823).
9. Wickham flint-lock musket (1826).
10. Springfield flint-lock musket (1827).
11. Flint-lock musket (E. W. Have, 1830).
12. Percussion-lock musket (G. S. Potsdam, 1833).
13. Harper's Ferry breech-loading flint-lock rifle (J. H. Hall, 1831).
14. Springfield percussion-lock musket (1836).
15. North's breech-loading rifle (1836).
16. Harper's Ferry flint-lock rifle (1838).
17. Hall's breech-loading rifle.
18. North's percussion carbine (1840).
19. Prussian musket (1842).
20. Harper's Ferry musket (1842).
21. Jenks' breech-loading rifle (1843).
22. Breech-loading carbine, long (Jenks').
23. Navy flint-lock musket altered to percussion musket.
24. Jenks' breech-loading rifle (1844).
25. Breech-loading carbine (North).
26. Jenks' carbine, short (1845).
27. North's carbine (1846).
28. Sharps carbine (1848).
29. Sharps carbine (1848).
30. Sharps carbine (1848).
31. Springfield musketoon, furnished by Union Defense Committee (1848).
32. Sharps carbine (1848).
33. Rifle musket (Robbins & Lawrence).
34. Springfield cavalry carbine.
35. Tower musket (1851).
36. Smooth-bored cadet's musket (Harper's Ferry).
37. Wandel rifle (1852).
38. Springfield breech-loading musketoon.
39. Palmetto armory musket, Columbia, S. C. (1852).
40. Enfield musket (1852).
41. Harper's Ferry rifle musket.
42. Springfield musketoon (1853).
43. Trident.
44. Harper's Ferry rifle (1853).
45. Harper's Ferry rifle (1854).
46. Plymouth rifle musket (Whitney Arms Co.).
47. Breech-loading carbine (Joslyn, 1855).
48. Breech-loading carbine (J. H. Merrill).
49. Breech-loading carbine (J. H. Merrill, 1856).
50. Maynard's carbine (1846).
51. Maynard's breech-loading carbine.
52. Maynard's breech-loading carbine (1856).
53. Burnside's breech-loading carbine.
54. Breech-loading carbine (L. H. Gibb)
55. Springfield rifle (1857).
56. Remington musket (1857).
57. Breech-loading rifle (Greene).
58. Breech-loading carbine (Smith).
59. Breech-loading carbine (Greene).
60. Colt's revolving rifle (1850).
61. Colt's revolving rifle (1850).
62. Colt's revolving rifle and bayonet.
63. Colt's revolving rifle (1857).
64 Merrill's breech-loading carbine (1858).
65. Harper's Ferry musket broken by a shot (1858).
66. Plymouth rifle with tape primer (1858).
67. Merrill's breech-loading rifle and saber-bayonet.
68. Merrill's breech-loading repeating rifle.
69. Starr's breech-loading carbine.
70. Burnside's breech-loading rifle.
71. Tower musket, flint lock.
72. Plymouth rifle broken by a shot (1858).
73. Sharps breech-loading rifle.
74. Sharps breech-loading rifle (1859).
75. Sharps breech-loading rifle (1859).
76. Sharps breech-loading rifle (1859).
77. Lindner's breech-loading carbine.
78. Tower rifle and sword-bayonet (1859.)
79. Sharp & Hankins carbine (1859).
80. Sharp & Hankins eech-loading carbine.
81. Sharp & Hankins rifle carbine.

SECTION I.—NAVAL ORDNANCE—Continued.

82. Sharp & Hankins breech-loading rifle.
83. Sharp & Hankins breech-loading rifle (1859).
84. Sharp & Hankins breech-loading rifle (1859).
85. Lindsay's rifle with two hammers (1860).
86. Harper's Ferry rifle (1860).
87. Gallagher's breech-loading carbine.
88. Spencer's breech-loading repeating rifle.
89. Springfield rifle, U. S.
90. Tower rifle (1861).
91. Tower rifle (1861).
92. Tower rifle (1861).
93. Ballard's breech loading carbine.
94. Tower rifle (1861).
95. Cook & Bro. rifle (1864).
96. Gwyn & Campbell's breech-loading carbine.
97. U. S. rifle (Whitneyville, 1864).
98. Palmer's breech-loading carbine.
99. Prussian musket.
100. Vincennes rifle.
101. Spencer's breech-loading carbine.
102. Whitney rifle.
103. Rifle (unknown).
104. Walter's breech-loading rifle.
105. Sporting rifle.
106. Greene's breech-loading rifle (1857).
107. Joslyn's breech-loading carbine.
108. Perry's breech-loading carbine.
109. Joslyn's breech-loading rifle.
110. Joslyn's breech-loading rifle.
111. Vincennes rifle and saber-bayonet.
112. Perry's breech-loading carbine.
113. Remington's breech-loading carbine.
114. Remington's breech-loading carbine.
115. Remington's breech-loading carbine.
116. Springfield musket, altered, and bayonet.
117. Springfield musket, altered.
118. Remington's breech-loading rifle and bayonet.
119. Remington's navy rifles, with sword bayonet, cal. 0.50 inch (1868).
120. Remington's navy carbines, cal. 0.50 inch (1866).
121. Remington's carbines.
122. Remington's navy carbines.
123. Springfield shoulder pistol.
124. Roman sword.
125. Remington's carbine (old pattern).
126. Saber bayonet.
127. Porter's rifle.
128. Cutlass (U. S. N.).
129. Officer's cutlass (U. S. N.).
130. Remington's carbine (old pattern).
131. Saber-bayonet and scabbard.
132. Saber-bayonet and scabbard.
133. Revolver (Savage).
134. Saber bayonets.
135. Revolver (Joslyn).
136. Sword-bayonet.
137. Saber-bayonet and scabbard.
138. Revolver (Allen & Wheelock).
138*a*. Saber-bayonets
139. Revolver (Starr).
140. Saber-bayonet and scabbard.
141. Saber bayonet.
142. Remington's pistol, nickel-plated (1866).
143. Common bayonets.
144. Remington's breech-loading pistol.
145. Common bayonets.
146. Remington's pistol (1866).
147. Common bayonets.
148. Common bayonets.
149. Common bayonets.
150. Virginia muskets, flint lock (1817).
151. Remington's navy rifles, cal. 0.50 inch (1874).
152. Virginia musket (1818).
153. U. S. flint-lock musket.

CLASS D.—HEAVY AND LIGHT PROJECTILES.

1. 200-pdr. Globe shell (Stafford).
2. 150-pdr. Dahlgren hollow shot.
3. 30-pdr. Dahlgren steel bolt shot
4. 50-pdr. Dahlgren steel bolt shot.
5. 50-pdr. steel shot (Holroyd).
6. 12-pdr. shot (Dahlgren).
7. 20-pdr. shot (Dahlgren).
8. 20-pdr. hollow shot (Dahlgren).
9. 50-pdr. hollow shot (Dahlgren).
10. 30-pdr. shot (Dahlgren).
11. 50-pdr. shot (Dahlgren).
12. XV-inch solid shot.
13. XV-inch shrapnel.
14. XV-inch shell (3 fuze-holes).
15. 50-pdr. shell (Dahlgren).
16. 12-pdr. shell (Dahlgren).
17. 12-pdr. grape (Dahlgren).
18. 200-pdr. sub-caliber shot (Stafford).
19. 150-pdr. sub-caliber shot (Stafford).
20. 200-pdr. sub-caliber shot (Emery).

SECTION I.—NAVAL ORDNANCE—Continued.

21. XV-inch hollow shot.
22. 150-pdr. steel shot (Dahlgren).
23. 50-pdr. sub-caliber shot (Ganster).
24. 50-pdr. sub-caliber shot (Stafford).
25. XV-inch canister.
26. 4.3-inch shot, wrapped with rope.
27. 50-pdr. Dahlgren shell; section.
28. 30-pdr. Dahlgren shell; section.
29. 12-pdr. Dahlgren shell; section.
30. 20-pdr. Dana shell; section.
31. 200-pdr. sub-caliber shot (Smith).
32. XV-inch grape.
33. XV-inch sub-caliber shot (Stafford).
34. 60-pdr. Parrott shell.
35. 30-pdr. Parrott shell.
36. 30-pdr. Parrott canister.
37. 20-pdr. Parrott shell.
38. 10-pdr. Parrott shell.
39. 30-pdr. Parrott shell; section.
40. 100-pdr. Parrott shell; section.
41. 20-pdr. Parrott shrapnel
42. XIII-inch solid shot.
43. 12-pdr. shot (Dahlgren).
44. 50-pdr. steel shot (Dahlgren).
45. 6-pdr. shot (Dahlgren).
46. 12-pdr. canister (Dahlgren).
47. 100-pdr. Parrott shell; long.
48. 200-pdr. Parrott shell.
49. 150-pdr. Schenkl shell.
50. 140-pdr. Schenkl shrapnel.
51. 200-pdr. hollow shot (Parrott).
52. 150-pdr. sub-caliber shot (Stafford).
53. 100-pdr. short shot (Parrott).
54. 100-pdr. shrapnel (Parrott).
55. 30 pdr. shrapnel (Parrott).
56. 10-pdr. shrapnel (Parrott).
57. 60-pdr. shrapnel (Parrott).
58. 30-pdr. shrapnel (Parrott).
59. 100-pdr. shot, chilled end (Parrott).
60. 100-pdr. shell (Parrott).
61. 60-pdr. shot (Parrott).
62. 100-pdr. hollow shot (Parrott).
63. 200-pdr. shot, chilled end (Parrott).
64. 30-pdr. sub-caliber shot (Stafford).
65. 50-pdr. sub-caliber shot (Emery).
66. 30-pdr. sub-caliber shot (Emery).
67. 24 pdr. shrapnel.
68. 24-pdr. shell.
69. 24-pdr. canister.
70. 12-pdr. heavy shell.
71. 12-pdr. heavy shrapnel.
72. 12-pdr. heavy canister.
73. 12-pdr. light shrapnel.
74. 12-pdr. light canister.
75. 12-pdr. light shell.
76. XV-inch shell (3 fuze-holes).
77. XV-inch shell (3 fuze-holes).
78. XV-inch steel shot.
79. XV-inch steel shot.
80. 32-pdr. shell.
81. 12-pdr. shot (Dahlgren).
82. 12-pdr. Hotchkiss percussion shell.
83. 12-pdr. Hotchkiss time-shell.
84. 12-pdr. Dahlgren time-shell.
85. 12-pdr. Dahlgren blind shell.
86. 12-pdr. Dahlgren shell.
87. 100 pdr. Parrott shell.
88. 100-pdr. Parrott shrapnel.
89. XI-inch shell.
90. XI-inch shell.
91. IX-inch shell.
92. VIII-inch shell.
93. 32-pdr. shell.
94. 150-pdr. Hotchkiss shell.
95. 50-pdr. Hotchkiss shell.
96. 80-pdr. Hotchkiss shot.
97. 60-pdr. Hotchkiss shot.
98. 100-pdr. Hotchkiss shot.
99. 80-pdr. Hotchkiss shot.
100. 100-pdr. sub-caliber shot (Stafford).
101. 20-pdr. Hotchkiss shell.
102. 30-pdr. Hotchkiss shell.
103. 20-pdr. Hotchkiss shell.
104. 12-pdr. Hotchkiss shell.
105. 12-pdr. Hotchkiss shrapnel.
106. 12-pdr. Hotchkiss shot.
107. 12-pdr. Hotchkiss canister.
108. 12-pdr. James shot.
109. 200-pdr. Stafford Globe shot.
110. 80-pdr. Schenkl shell.
111. 80-pdr. Schenkl shrapnel.
112. 7-inch Globe shot (Stafford).
113. 20-pdr. Parrott shot.
114. 3.50-inch Sawyer canister.
115. 50-pdr. Schenkl shell.
116. 100-pdr. Schenkl shell—short.
117. 20-pdr. Schenkl shot.
118. 50-pdr. Schenkl shot.
119. 12-pdr. Schenkl shell.
120. 20-pdr. Schenkl canister—sectional.
121. Shell (A. C. Twining).
122. 3.63-inch Sawyer canister.
123. 30-pdr. Schenkl steel shot.
124. 50-pdr. Schenkl steel shot.
125. 20-pdr. Schenkl shell.
126. 30-pdr. Schenkl shell.
127. 20-pdr. Schenkl shrapnel.
128. 30-pdr. Schenkl shrapnel.

SECTION I.—NAVAL ORDNANCE—Continued.

129. 80-pdr. Sawyer shell.
130. 50-pdr. Sawyer shell.
131. 30-pdr. Sawyer shell.
132. 12-pdr. Sawyer shell.
133. 20-pdr. Sawyer shell.
134. 10-pdr. Sawyer shot.
135. 10-pdr. Sawyer shell.
136. 30-pdr. Sawyer shot.
137. 12-pdr. Sawyer shell.
138. Sawyer canister, 4.48-inch diameter.
139. Sawyer canister, 3.55-inch diameter
140. Sawyer canister, 4.50-inch diameter.
141. Sawyer canister, 3.50-inch diameter.
142. Sawyer canister, 3.30-inch diameter.
143. 12-pdr. Schenkl canister.
144. VIII-inch James shell.
145. 100 pdr. Brooke steel shot.
146. IX-inch service shrapnel (strapped).
147. VIII-inch Birney shell.
148. Mann's shot, diameter 8.20-inch.
149. Cochran shot, diameter 4.58-inch.
150. 32-pdr. shrapnel.
151. 32-pdr. shell.
152. XI-inch grape.
153. X-inch grape.
154. IX-inch grape.
155. XI-inch canister.
156. X-inch canister.
157. XI-inch shell (3 fuze-holes).
158. XI-inch shrapnel.
159. XI inch shell.
160. X-inch shrapnel.
161. X-inch shell.
162. IX-inch shell.
163. VIII-inch shell (eccentric).
164. 42-pdr. shell.
165. VIII-inch shell (zinked).
166. VIII-inch shell (papered).
167. VIII-inch shell (zinked and papered).
168. 32-pdr. shell.
169. 32-pdr. shell (zinked).
170. IX-inch canister.
171. VIII-inch canister.
172. 32-pdr. canister.
173. 32-pdr. shell (in bag).
174. 32-pdr. shell (not strapped).
175. 32-pdr. shell.
176. 32-pdr. shell.
177. 32-pdr. shell (Hotchkiss ring fuze).
178. 32-pdr. solid shot.
179. 80-pdr. Atwater's shot.
180. 150-pdr. Ames steel shot.
181. 60-pdr. White's shell.
182. 60-pdr. Bradley's shell.
183. 80-pdr. Bradley's shell.
184. Wood's shell, 5.10-inch diameter.
185. 20-pdr. Dana's shell.
186. Cochran shot, 3.55-inch diameter.
187. Shell (Fayetteville Arsenal).
188. 12-pdr. Cochran shell.
189. 20-pdr. Cochran shell.
190. Cochran shell, 3.81-inch diameter.
191. Mann's shell, 4.30-inch diameter.
192. Shrapnel, 3.80-inch diameter.
193. 12-pdr. Dana's shell.
194. Stearns' shell, 2-inch diameter.
194*a*. Stearns' shot, 2-inch diameter.
195. Stearns' hollow shot, 2-inch diameter.
196. XI-inch solid shot.
197. XI inch shot (Johnson).
198. VIII-inch solid shot.
199. IX-inch solid shot.
200. VIII-inch shrapnel.
201. VIII-inch shell.
202. IX-inch shell (not strapped or bouched).
203. Callender shell, 5.80-inch diameter.
204. Steel-pointed shell, 5.04-inch diameter (Johnson).
205. Cochran shell, 3.50-inch diameter.
206. 30-pdr. shot and shell combined (Kellog).
207. Gauster 12-pdr. shell.
208. Percussion shell, 2.95-inch diameter (Mitchell & Bennet).
209. Shell, 5.07-inch diameter (Dr. Reed).
210. 20-pdr. shell (White).
211. 12-pdr. shell (Johnson).
212. 12-pdr. shell (Brokel).
213. 32-pdr. shell.
214. 24-pdr. shell.
215. 24-pdr. chilled shot.
216. 24-pdr. shrapnel.
217. 32-pdr. shell (Holroyd).
218. Stevens shell, 5.60 inch diameter, with four fans at base to obtain rotary motion.
219. Conical shell, 3.70-inch diameter.
220. Shell, 3-inch diameter.
221. XI-inch shell (Williams).
222. X-inch shell.
223. Shot, 5.07-inch diameter (Dr. Reed).
224. Shot, 3.64-inch diameter (Cochran).
225. 30-pdr. shell (Kellog).
226. Shot, 4.37-inch diameter (Dimick).
227. 12-pdr. shot.

SECTION I.—NAVAL ORDNANCE—Continued.

228. Shot, 3.38-inch diameter (Captain Henry).
229. 12-pdr. steel shot (Halsey).
230. Shot, 3.65-inch diameter (Captain Henry).
231. Shot, 3.54-inch diameter (Dr. Reed).
232. Shot, 2.20-inch diameter (Glenn).
233. Shot, 3.70-inch diameter (Merrill).
234. 6-pdr. shot (Kellog).
235. Shot, 2.66-inch diameter (Lyman).
236. Expansion bands for Dana's shell.
237. Remnant of rifle steel shot.
238. 12-pdr. shot (Henry).
239. Hollow shot, 11.90-inch diameter (Burnside).
240. Shot, 4.50-inch diameter (McDonough).
241. Shot, 5-inch diameter (Kenyon).
242. Shot, 6.25-inch diameter (Holroyd).
243. Shot, 5.65-inch diameter.
244. Shot, 4.45-inch diameter (Oliver).
245. Shot, 3.90-inch diameter.
246. Shot, 4.65-inch diameter (Hall & Colby).
247. Shot, 6.35-inch diameter (Commodore Smith).
248. Shot, volcanic, 2.70 inch diameter.
249. Canister, 3.55-inch diameter.
250. 12-pdr. shot (Holroyd).
251. Shot, 6.30-inch diameter (Burnside).
252. Shot, 5.90-inch diameter.
253. Shot, 5.85-inch diameter.
254. Shot (Holroyd).
255. X-inch solid shot.
256. 12-pdr. shot (Dahlgren).
257. Chain shot (Stearns).
258. 12-pdr. shot (Holroyd).
259. VIII inch shell (Jones).
260. VIII-inch grape.
261. 32-pdr. grape.
262. 18-pdr. grape.
263. 12-pdr. grape.
264. XIII-inch solid shot.
265. Section of IX-inch service shell.
266. Section of XI-inch service shell.
267. Section of X-inch service shell.
268. Section of IX-inch McIntyre shell.
269. Section of IX-inch Peavy shell.
270. Section of IX-inch service shell.
271. Section of VIII-inch service shell.
272. Section of 32-pdr. service shell.
273. Section of 24-pdr. shell.
274. Section of 12-pdr. shell.
275. Section of 12-pdr. shrapnel (Hilkins).
276. Section of 12-pdr. service shrapnel.
277. Compound shell.
278. 12-pdr. shell.
279. 12-pdr. shrapnel (Felton, Hanes & Atkins).
280. McIntyre shell, 3.41-inch diameter.
281. Shell, 3.25-inch diameter.
282. XV-inch service shrapnel—broken.
283. X-inch cast iron shot.
284. XI-inch cast iron shot.
285. XI-inch wrought iron shot.
286. X-inch wrought-iron shot.
287. 80-pdr. wrought-iron shot (Dahlgren.)
288. VIII-inch wrought-iron shot.
289. 80-pdr. shot (Dahlgren).
290. 30-pdr. steel shot (Dahlgren).
291. 20-pdr. steel shot (Halsey).
292. Remnant of steel shot (Schenkl).
293. 150-pdr. steel shot (Jenkins).
294. 150-pdr. steel shot (Dahlgren).
295. XI-inch wrought-iron cored shot.
296. XI-inch cast-iron cored shot.
297. VIII-inch rifled shot (Mann).
298. 100-pdr. steel shot (Jenkins).
299. VII-inch wrought-iron shot (Brooke).
300. XI-inch cast-iron shot (Brooke).
301. Fragments of 32-pdr. shells.
302. XII-inch Parrott shot.
303. XII-inch Hotchkiss shot.
394. XII-inch Rodman shot.
305. Shell for 3-inch breech-loading rifle.
306. 150-pdr. shrapnel (Schenkl).
307. Cochran shot.
308. Lyman's shot; long.
309. James shot.
310. Shell, 6.30 inches di[illegible]ter, with rubber band.
311. Hotchkiss shot.
312. 12-pdr. shell (Hotchkiss).
313. 12-pdr. shell (Hotchkiss).
314. 10-pdr. shell (Parrott).
315. 10-pdr. shell (Parrott).
316. 20-pdr. with combination fuze (Hotchkiss).
317. 20-pdr. with combination fuze (Hotchkiss).
318. 20-pdr. shell (Hotchkiss).
319. 50-pdr. shell (Hotchkiss).
320. 20-pdr. shot (Parrott).
321. 12-pdr. shot, with brass expansion ring (Dahlgren).
322. 20-pdr. shell (Dahlgren), with Wright & Hotchkiss fuze.

SECTION I.—NAVAL ORDNANCE—Continued.

323. 20-pdr. shell (Dahlgren), with Wright & Hotchkiss fuze.
324. 12-pdr. shell (Dahlgren), with Wright & Hotchkiss fuze.
325. 50-pdr. shell (Dahlgren).
326. 50-pdr. shell (Dahlgren).
327. 50-pdr. shot with brass expansion cup (Dahlgren).
328. 20-pdr. shell (Dahlgren).
329. 12-pdr. shell (Dahlgren), with four strips of lead to fit grooves of gun.
330. 12-pdr. shot, with lead expansion (Dahlgren).
331. 12-pdr. shot, with lead expansion (Dahlgren).
332. 12-pdr. shot, with two brass expansion rings (Dahlgren).
333. 12-pdr. shot, with brass expansion cup (Dahlgren).
334. 12-pdr. shell, with brass expansion cup (Dahlgren).
335. 12-pdr. shot (Dahlgren).
336. IX-inch shell; section.
337. IX-inch shell; section.
338. IX-inch shell; section.
339. IX-inch shell; section.
340. IX-inch shell; section.
341. VIII-inch service shell; section.
342. 12-pdr. shell, with lead expansion; section (Dahlgren).
343. 12-pdr. shell, with lead expansion; section (Dahlgren).
344. 12-pdr. shell, with lead expansion; section (Dahlgren).
345. 12-pdr. shell, with lead expansion; section (Dahlgren).
346. 12-pdr. shell, with lead expansion; section (Dahlgren).
347. 12-pdr. shell, with composition expansion cup; section (Dahlgren).
348. 12-pdr. shell, with composition expansion cup; section (Dahlgren).
349. 30-pdr. shell, with composition expansion cup; section (Dahlgren).
350. 30-pdr. shell, with lead expansion cup; section (Dahlgren).
351. 50-pdr. shell, with lead expansion cup, section (Dahlgren).
352. 50-pdr. shell, with composition expansion cup; section (Dahlgren).
353. 30-pdr. shell; section (Parrott).
354. Shot, 6.25-inch diameter, with four flanges extending from center to base (Moses Hill).
355. 12-pdr. shrapnel (Sawyer).
356. 50-pdr. sub-caliber shot (Stafford).
357. 50-pdr. sub-caliber shot (Stafford).
358. 50-pdr. sub-caliber shot (Stafford).
359. 30-pdr. shot (Emery).
360. 12-pdr. shot (Hotchkiss).
361. 12-pdr. shell, with lead expansion (Dahlgren).
362. 100-pdr. shell; section (Parrott).
363. 30-pdr. shrapnel (Parrott).
364. 50-pdr. shell (Sawyer).
365. 12-pdr. shell (James).
366. Shell, 3-inch diameter, with four fans to obtain rotary motion; glass cylinder inside the shell.
367. James shot.
368. VIII-inch shot.
369. VIII-inch shot.
370. VIII-inch shot.
371. VIII-inch shell.
372. VIII-inch shrapnel.
373. VIII-inch grape.
374. IX-inch shot.
375. IX-inch shot.
376. IX-inch shot.
377. IX-inch shell.
378. IX-inch shrapnel.
379. IX-inch canister.
380. IX-inch grape.
381. VIII-inch rifle shell, conical.
382. VIII-inch rifle shell, conical.
383. XV-inch shell (3 fuze-holes).
384. XV-inch shrapnel.
385. XV-inch shrapnel.
386. XV-inch shot.
387. XV-inch shot.
388. XV-inch shot.
389. XV-inch grape.
390. XV inch grape.
391. XV-inch canister.
392. 60-pdr. shell (Parrott).
393. 60-pdr. shell (Parrott).
394. 60-pdr. shrapnel (Parrott).
395. XI-inch shot.
396. XI inch shot.
397. XI-inch shot.
398. XI-inch shot.
399. XI inch shot.
400. XI-inch shell.
401. XI-inch shrapnel.
402. XI-inch shrapnel.
403. XI-inch canister.
404. XI-inch grape.
405. XI-inch grape.

SECTION I.—NAVAL ORDNANCE—Continued.

406. X-inch shot.
407. X-inch shell.
408. 32-pdr. shot.
409. 32-pdr. shot.
410. 32-pdr. shot.
411. 32-pdr. shot.
412. 32-pdr. shot.
413. 32-pdr. shell.
414. 32-pdr. shrapnel.
415. 32-pdr. shrapnel.
416. 32-pdr. canister.
417. 32-pdr. grape.
418. 32-pdr. grape.
419. 20-pdr. rifle shot.
420. 20-pdr. rifle shot.
421. 100-pdr. shot (Parrott).
422. 100-pdr. shot (Parrott).
423. 100-pdr. shell (Parrott).
424 100-pdr. shell (Parrott).
425. 100-pdr. shrapnel (Parrott).
426. Shot, shell, and charges for De Brame's gun.
427. Elevating screw and shot for Floyd's gun.
428. 30-pdr. shell (Parrott).
429. 12-pdr. shrapnel (Cochran).
430. 12-pdr. shot (Dahlgren).
431. Shot (Burnside).
432. Shot (Burnside).
433. 12-pdr. canister (heavy).
434. Projectile, with rope attached, to be fired from a vessel toward the shore.
435. Shot covered with leather.
436. 12-pdr. shot (Dahlgren).
437. 12-pdr. shot.
438. 12-pdr. shell with lead expansion.
439. 12-pdr. shot (Hotchkiss).
440. 20-pdr. shrapnel (Parrott).
441. Shot, 2.85-inch diameter, with three fans to obtain rotary motion.
442. 30-pdr. steel shot (Dahlgren)
443. 12-pdr. shell, brass fuze-stock.
444. 80-pdr. shot, wrought iron (Dahlgren).
445. Shell for 3-inch breech-loading rifle, with brass expansion.
446. Shell for 3 inch breech-loading rifle, with brass expansion.
447. Shell for 3-inch breech-loading rifle, with lead expansion.
448. Shell for 3-inch breech-loading rifle, with brass expansion.
449. Shot (Burnside).
450. Compound shell.

CLASS E.—SMALL-ARMS AMMUNITION.

1. Machine for making caps.
2. Cap-filling machine.
3. Cap-varnishing machine.
4. Navy time-fuze machine, and tools, complete.
5. Laboratory box, containing cartridges, percussion caps, navy time-fuzes, cannon and friction primers.
6. Improved bomb lance (Brand).
7. Hand grenades (Ketchum).
8. Portion of a war rocket.
9. Revolving rifle cartridges (Colt).
10. Carbine cartridges (Perry).
11. Musket cartridges (U. S. N.).
12. Revolver cartridges (Joslyn).
13. Carbine cartridges (Sharp).
14. Buckshot cartridges (U. S. N.).
15. Buckshot cartridges (U. S. N.).
16. Plymouth rifle cartridges.
17. Musket blank cartridges, cal. 0.69 (U. S. N.).
18. Carbine cartridges (Jenks).
19. Boarding pistol cartridges (U. S. N.).
20. Musket blank cartridges, cal. 0.58 (U. S. N.).
21. Musket ball cartridges (U. S. N.).
22. Pistol cartridges, metallic (Remington).
23. Rifle cartridges, metallic (Burnside).
24. Rifle cartridges, metallic (Spencer).
25 Carbine cartridges, metallic (Hall & Hub).
26. Rifle cartridges, metallic (Powers).
27. Army cartridges, cal. 0.58.
28. Army cartridges, cal. 0.50
29. Cartridges, cal. 0.50 (Berdan).
30. Cartridges, cal. 0.43 (Berdan).
31. Cartridges, cal. 0.42 (Berdan).
32. Tape primer (Maynard).
33. Sample cartridges.
34. Lead balls (Clark).
35. Gun cappers (E. D. Seely).
36. Sample shots (New York Shot and Lead Co.).
37. Sample musket balls, lead, steel, and copper.
38. Percussion primers (U. S. N., 1846.).
39. Quilted primers (U. S. N.).
40. Percussion primers (U. S. N. regulation).
41. Friction primers (U. S. N. regulation).
42. Cannon wafers (U. S. N., 1850).

SECTION I.—NAVAL ORDNANCE—Continued.

43. Cannon caps (U. S. N., 1846).
44. Lead tube primers (U. S. N.)
45. Percussion primers (E. Gomez, 1864).
46. Percussion primers, paper tube (1853).
47. Spur tubes (U. S. N., 1847).
48. Percussion primers and package of composition (Blake, 1864).
49. Specimens of small-arms ammunition. (Appendix No. 1.)

CLASS F.—LOADING GEAR, CANNON LOCKS, FUZES, VENT IMPRESSIONS, ETC., ETC.

1. XV-inch passing box.
2. XI-inch passing box.
3. IX-inch passing box.
4. VIII-inch passing box.
5. 32-pdr. passing box.
6. 100-pdr. passing box.
7. 12-pdr. smooth-bored passing box.
8. 12-pdr., rifle, passing box.
9. 20-pdr., rifle, passing box.
10. Match stave.
11. Port-fire stave.
12. Cutlass scabbard and frog.
13. Single-sticks.
14. Adze.
15. Copper knife.
16. Fire-bucket and lanyard.
17. Junk wads.
18. Grommet wad.
19. Rifle cartridge-box.
20. Carbine cartridge-box.
21. Revolver cartridge-box.
22. Primer-box.
23. Powder-flask.
24. Powder-scoop.
25. Battle-ax and frog.
26. Boring-bits.
27. Priming-wires.
28. Brace, drill, and punch.
29. 20-pdr. breeching.
30. 24-pdr. side tackles.
31. Funnel and measure.
32. 12-pdr. (light) elevating screw.
33. Rattle, fixed.
34. Waist-belts.
35. Magazine lantern.
36. Magazine candle and stick.
37. Battle lantern.
38. Hand grenades.
39. Tank wrench.
40. Cartridge-bags, 12-pdr. to XV-inch.
41. IX and XI inch side sights.
42. 32-pdr. breech sights.
43. Tompions and wads, 12-pdr. to XI-inch.
44. Formers for cartridge-bags, 12-pdr. to IX-inch.
45. Lock toggles.
46. Vent guard.
47. Fuze cutter.
48. Lock lanyards.
49. 20-pdr. sight.
50. Pistol cartridge-box.
51. Fuze wrenches (Nos. 1 and 2).
52. Fuze picker.
53. Magazine vise.
54. Spring-spike.
55. Rifle shell fuze-driver.
56. Pistol frog (U. S. N.).
57. Battle-ax frog (U. S. N.).
58. Cap pouch (U. S. N.).
59. Saber-bayonet frog (U. S. N.).
60. Saber-bayonet frog (U. S. N.).
61. Cutlass frog (U. S. N.).
62. Cutlass frog (U. S. N).
63. Bowie-knife frog (Ames).
64. Cutlass belt and frog.
65. Waist-belt (U. S. N.).
66. Waist-belt (U. S. N.).
67. Waist-belt (U. S. N.).
68. XI-inch rubber passing box (Vanderpool).
69. Pattern of rubber fire-bucket (Vanderpool).
70. Cartridge-box, with elastic bottoms, and belt (Newcomb & Lyons).
71. Waist-belt and bayonet-frog.
72. 32-pdr. cap squares.
73. Cannon lock, flint (Hidden).
74. Stands for repeating swivels.
75. Gun scraper.
76. Sectional rammer.
77. Rammer (Walker).
78. Rammer head, rubber (Day).
79. Bristle sponge heads (Bachemyer).
80. Wire sponge heads.
81. Bristle sponge heads (U. S. N.).
82. Wood model (design unknown).
83. Bore scraper (Ball).
84. Cannon lock (Hidden).
85. Ladle and worm connected for light 12-pdr. howitzer.
86. Stand for double-barrel swivel.
87. VIII-inch sight.
88. VIII-inch sight, re-enforce.
89. 32-pdr. sight.

SECTION I.—NAVAL ORDNANCE—Continued.

90. 100-pdr. sight, re-enforce and breech.
91. IX-inch breech sight.
92. 32-pdr. breech sight.
93. Sight.
94. Expansion band, raw hide.
95. Cannon lock, percussion (James).
96. Cannon lock, percussion (Shaw).
97. Cannon lock, percussion (Ashard).
98. Cannon lock, flint (Hidden).
99. Cannon lock, percussion (Hidden).
100. Cannon lock, percussion (Dahlgren).
101. Cannon lock, 32-pdr. (Hidden).
102. Cannon lock, 32-pdr. (Ames).
103. Cannon lock, 32-pdr. (Dahlgren).
104. Cannon lock, 32-pdr. (Dahlgren).
105. Cannon lock, 12-pdr. howitzer (Dahlgren).
106. Cannon lock, 12-pdr. howitzer (Dahlgren).
107. Cannon lock, VIII-inch (Dahlgren).
108. Cannon lock, 30-pdr. (Parrott).
109. Cannon lock, 30-pdr. (U. S. N.).
110. Brass swivels for boats.
111. Cannon lock for wafers.
112. Stands for brass swivels.
113. Cannon lock, percussion.
114. Cannon lock (Barry).
115. Cannon lock, flint (Hidden).
116. Cannon lock, percussion (Hidden).
117. Brass cannon lock, percussion (Burdett).
118. Cannon lock, 32-pdr. (Dahlgren).
119. Cannon lock, 24-pdr. howitzer (Dahlgren).
120. Steel shot (Lyman's) and iron target.
121. Steel shot (Lyman's) and wood target.
122. Calcium light reflector (Hooper & Co.).
123. Signal shell.
124. Semaphoric telegraph lamp (Rogers).
125. IX-inch ladle (Watkins).
126. Trunnion sight (U. S. N.).
127. Trunnion gauge.
128. Signal rockets with balloon (Edge).
129. Cartridges in box (Wise).
130. Combination fuzes (Sawyer).
131. Fuze, submarine, safety (Gomez).
132. Fuze, submarine, galvanic (Gomez).
133. Fuze, submarine, water-train.
134. Fuze, submarine (Gomez).
135. Fuze, submarine, sample of (Gomez).
136. Fuze, submarine, safety (Reynolds & Bro.).
137 Fuze, submarine (Toy, Bickford & Co.).
138 Rocket fuze (Hunt).
139. Fuze, concussion (Dana).
140 Fuze, concussion (Hubbell).
141. Fuze, 20 seconds (Hill).
142. Fuze, 10 seconds (Dahlgren).
143. Fuze (Crane).
144. Fuze (U. S. N.).
145. Fuze, 10 seconds (U. S. N.).
146. Fuze, time and concussion (McIntyre & Balou).
147. Fuze (Alger) and paper case (Harwood).
148 Fuze, wood stock, sample (Hogg).
149. Fuze (Laidley).
150 Fuze, concussion (Stevens).
151 Fuze, concussion (Taylor).
152. Fuze, time (Bormann).
153 Fuze, percussion (Holroyd).
154 Fuze, percussion (Rice).
155. Fuze, wood stock (U. S. N.).
156 Fuze for infernal machine.
157 Fuze, time and percussion, with bouche (Schenkl).
158 Fuze, time and percussion (Schenkl).
159 Fuze, time and percussion (Wright & Hotchkiss).
160. Fuzes, percussion, assorted (Schenkl).
161. Fuzes, percussion, assorted (Hotchkiss).
162 Fuzes, percussion, assorted (Parrott).
163 Fuzes, percussion, assorted (Mumford).
164. Fuze, XIII-inch mortar.
165. Fuze, combination (Hotchkiss & Sons).
166 Adapting fuze bouching.
167. Fuzes, paper case, stock-metal, and lead.
168. Fuzes, spelter, Parrott shrapnel.
169. Adapting bouche.
170 Spelter rings for navy time-fuze.
171. Adapting bouche for navy time-fuze.
172 Spelter stocks, paper case fuzes.
173. Fuzes, time (Parrott).
174 Vent impressions.
175. Cutlasses, Roman.
176 Sword (U. S. N.).
177. XI-inch bristle sponge.
178. IX-inch bristle sponge.
179 VIII-inch bristle sponge.
180. XI-inch worm.

SECTION I.—NAVAL ORDNANCE—Continued.

181. IX-inch worm.
182. Ordinary quoin.
183. 20-pdr. rammer and sponge connected, and cap.
184. 20-pdr. bristle sponge.
185. 24-pdr. rammer and sponge connected, and cap.
186. 12-pdr. (heavy) rammer and sponge connected, and cap.
187. 12-pdr. (rifle) rammer and sponge connected, and cap.
188. 32-pdr. bristle sponge.
189. 100-pdr. bristle sponge.
190. 32-pdr. woolen sponge and cap.
191. 100-pdr. woolen sponge and cap.
192. 24 pdr. ladle and worm connected.
193. 12 pdr. (heavy) ladle and worm connected.
194. 12-pdr. (light) ladle and worm connected.
195. 12-pdr. (rifle) ladle and worm connected.
196. XI-inch woolen sponge and cap.
197. IX-inch woolen sponge and cap.
198. VIII-inch worm.
199. XI-inch rammer.
200. IX inch rammer.
201. VIII-inch rammer.
202. VIII-inch woolen sponge and cap.
203. Trail bars.
204. Roller handspikes, IX-inch.
205. Roller handspikes, 32-pdr.
206. Roller handspikes, 32-pdr.
207. Roller handspikes, IX-inch.
208. Ordinary handspikes.
209. Ordinary handspikes.
210. Scraper for 32-pdr.
211. Scraper for 100-pdr.
212. Scraper for 20-pdr.
213. Scraper, XI-inch.
214. Scraper, IX inch.
215. Scraper, VIII-inch.
216. Worm, 32-pdr.
217. Rammer, 100-pdr.
218. Boarding pike and guard.
219. Impression taker, VIII-inch.
220. Impression taker, 32-pdr.
221. Navy time fuzes.
222. Fuzes (Bormann).
223. Percussion fuzes (Schenkl).
224. Percussion fuzes (Hotchkiss).
225. 2 pieces of solidified Greek fire (Short).
226. Port fire (U. S. N).
227. Signal rocket (U. S. N.).
228. Warning signals, green, white, and red.
229. Breech pieces, India rubber (H. H. Day).
230. Sabots (H. H. Hubbell).
231. Vent stopper.
232. Deck scraper.
233. Tompions
234. Dismounting chock.
235. Handspikes, ordinary.
236. Handspikes, roller.
237. Magazine shutter.
238. Expanding tompions.
239. Hand grenade and fuzes (Adams).
240. Hand grenade and fuzes (Adams).
241. XI-inch plug from cored shot.
242. Cartridge box (Holroyd).
243. Cartridge box (McGinnis).
244. Cartridge box (Morris).
245. Cartridge box and belt (Howlett).
246. Cartridge box and belt (Howlett).
247. Cartridge box (U. S. N.).
248. Mortar pouch.
249. Cartridge box (Spencer).
250. Cartridge box—revolver (U. S. N.).
251. Cartridge box—revolver (U. S. N.).
252. Set of night signals (Caston).
253. Rocket, serpent (Hadfield).
254. Rocket, stars (Hadfield).
255. Rocket (Hadfield).
256. Rocket, gold rain (Hadfield).
257. XIII inch mortar passing box.
258. 24-pdr. passing box.
259. 24-pdr. passing box.
260. 30-pdr. rifle passing box.
261. 60-pdr. passing box.
262. 100-pdr. passing box.
263. 32-pdr. passing box.
264. XI-inch passing box.
265. XI-inch passing box.
266. 32-pdr. passing box.
267. XV-inch passing box.
268. Purchase (Griolet).
269. Breechings: IX and XI inch, 20-pdr., 30-pdr., and 32-pdr.
270. Transporting handspike.
271. Transporting truck and axle.
272. Shot plug.
273. Shot plug—monitor.
274. Magazine air pump.
275. Magazine can.
276. Magazine bucket.
277. Chocking quoin.
278. Bolt and box (clevis).

SECTION I.—NAVAL ORDNANCE—Continued.

279. Dismounting chock.
280. Dismounting bar.
281. Trail bar.
282. Powder measures.
283. Sabot for shell.
284. Pivot socket.
285. Pivot bolt.
286. Pendulum.
287. Elevating screw.
288. Shifting chocks and boxes.
289. Side-up bolt.
290. Gun tackle.
291. Trunnion sight, XI-inch.
292. Bristle sponge heads, IX, XI, and XV inch.
293. Sponge head, plain, XV-inch.
294*a*. Section of breech of 32-pdr.
294*b*. Section of breech of VIII-inch gun.
295. Boat stove and fixtures.
296. Boat stove box.
297. Sweep piece.
298. Rubber buffer.
299. Candle mold.
300. Candlestick.
301. Selvedge.
302. IX-inch cartridge former.
303. XI-inch cartridge former.
304. XV-inch cartridge former.
305. Gun sling-chain.
306. Hoe and pickax.
307. Wood-ax.
308. Battle-ax.
309. Spare parts of small arms.
310. XV-inch gun scraper.
311. XI-inch gun scraper.
312. X-inch gun scraper.
313. IX-inch gun scraper.
314. VIII-inch gun scraper.
315. 32-pdr. scraper.
316. 100-pdr. scraper.
317. 60-pdr. scraper.
318. 30-pdr. scraper.
319. 20-pdr. scraper.
320. XV-inch passing box.
321. VIII-inch passing box.
322. 12-pdr. (light) passing box.
323. 12-pdr. (light) passing box.
324. 20-pdr. passing box.
325. VIII-inch rammer.
326. 32-pdr. rammer.
327. 100-pdr. rammer.
328. 60-pdr. rammer.
329. 30-pdr. rammer.
330. 20-pdr. rammer.
331. XV-inch worm.
332. XI-inch worm.
333. X-inch worm.
334. IX-inch worm.
335. VIII-inch worm.
336. 32-pdr. worm.
337. 100-pdr worm.
338. XI-inch sponge head.
339. X-inch sponge head.
340. IX-inch sponge head.
341. VIII-inch sponge head.
342. 32-pdr. sponge head.
343. 100-pdr. sponge head.
344. 60-pdr. sponge head.
345. 30-pdr. sponge head.
346. 20-pdr. sponge head.
347. XV-inch sponge, wool cover.
348. XI-inch sponge, wool cover.
349. IX-inch sponge, wool cover.
350. VIII-inch sponge, wool cover.
351. 32-pdr. sponge, wool cover.
352. 100-pdr. sponge, wool cover.
353. 60-pdr. sponge, wool cover.
354. 30-pdr. sponge, wool cover.
355. 20-pdr. sponge, wool cover.
356. 20-pdr. sponge, wool cover.
357. 24-pdr. sponge, wool cover.
358. 12-pdr. sponge, wool cover.
359. 12-pdr., rifled, sponge, wool cover.
360. Gatling gun equipments.
361. Gatling gun carriage.
362. Signal mortar.
363. Signal mortar.
364. French pistol.
365. Colt's revolver.
366. Bowie-knife.
367. Cutlass, Roman (old).
368. Tomahawk.
369. Lance.
370. Set of boarding pikes.
371. Magazine screen.
372. Magazine dress.
373. Dust pan.
374. Gong.
375. Powder shute.
376. 60-pdr. gun carriage and directing bar.
377. Inspecting instruments for guns.
378. Impressions taken from pressure plugs used in IX-inch gun No. 22 with charges of 10, 13, and 20 lbs. powder.

SECTION I.—NAVAL ORDNANCE—Continued.

379. Impressions taken from pressure plugs used in XII-inch Parrott rifle with charges of 30, 35, 40, and 45 lbs. of mammoth powder. Three impressions from 35 lbs. No. 7 powder.
380. Vent impressions of XI-inch gun No. 35 after 34 fires (U. S. gunboat "Seneca").
381. Vent impressions of chamber of 32-pdr. No. 41 after 405 rounds (1 inch from bore and upwards).
382. Vent impressions of 30-pdr. Parrott rifle after 3,000 fires.
383. Vent impressions of 30-pdr. Parrott rifle after 2,000 fires.
384. Parts of 3-inch breech-loading shell, burst at experimental battery, Annapolis, Md.
385. Parts of 3-inch breech-loading shell, burst at experimental battery, Annapolis, Md.
386. Vent impressions taken from first XI-inch gun.
387. Vent impressions of 32-pdrs. of 33 cwt.
388. Vent impressions of IX-inch gun No. 797, fired 1,082 rounds.
389. Vent impressions of XI-inch gun No. 897, fired 750 rounds.
390. 200 lbs. powder tank.
391. 100 lbs. powder tank.
392. 50 lbs. powder tank.
393. IX-inch chamber scraper.
394. VIII-inch chamber scraper.
395. 32-pdr. chamber scraper.
396. 32-pdr. of 4,500 lbs. chamber scraper.
397. 60-pdr. Parrott chamber scraper.
398. 20-pdr. Parrott chamber scraper.
399. 30-pdr. chamber scraper.
400. XV-inch ladle.
401. XI-inch ladle.
402. X-inch ladle.
403. IX-inch ladle.
404. VIII-inch ladle.
405. 32-pdr. ladle.
406. Cannon lock, flint (Hidden).
407. Cannon lock, flint (Hidden).
408. Cannon lock, flint (Hidden).
409. Cannon lock, percussion.
410. Cannon lock, percussion (Shaw).
411. Cannon lock, percussion (Shaw).
412. Cannon lock, percussion (unknown).
413. Cannon lock, percussion (Hidden).
414. Cannon lock, percussion (Hidden).
415. Cannon lock, percussion (Dahlgren).
416. Cannon lock, percussion (Dahlgren).
417. Cannon lock (Dahlgren).
418. Cannon lock (Dahlgren).
419. Trunnion level.
420. Small iron mortar.
421. Double-barrel flint-lock swivel.
422. Repeating swivel, flint-lock.
423. Repeating swivel, flint-lock.
424. Impressions taken from pressure plugs used in IX-inch gun No. 35 with charges of 50 lbs. powder.
425. Impressions taken from pressure plugs used in IX-inch shell gun with—
    7 charges of 10 lbs.;
    3 charges of 13 lbs.;
    3 charges of 15 lbs. powder.
426. Impressions taken from pressure plugs used in X-inch gun with charges of 12½, 15, 18, and 20 lbs. powder.
427. Rubber shot-plug for monitors.
428. Intrenching shovel.
429. Intrenching shovel.
430. Intrenching shovel.
431. Explosives used at torpedo station.
432. Hand rattle.
433. Hand rattle.
434. Gunpowder in glass bottles.
435. Bull's-eye lantern.
436. Powder measure.
437. Powder measure.
438. Powder measure.
439. Powder measure.
440. Powder measure.
441. India-rubber breech piece.
442. India-rubber breech piece.
443. India-rubber breech piece.
444. Ammunition chest.
445. Ammunition chest.
446. Ammunition chest.
447. Ammunition chest.
448. Ammunition chest.
449. Ammunition chest.
450. XV-inch chamber scraper.
451. XI-inch chamber scraper.
452. X-inch chamber scraper.
453. Impressions taken from pressure plugs used in the Hotchkiss 100-pdr. rifle gun with 10 lbs. charge.
454. Spare-article boxes for 12-pdr. howitzers.

SECTION I.—NAVAL ORDNANCE—Continued.

455. Spare-article boxes for 12-pdr. howitzers.
456. 60-pdr. breeching.
457. 60 pdr. rammer.
458. 60-pdr. bristle sponge.
459. 60-pdr. woolen sponge.
460. 60-pdr. scraper.
461. 60-pdr. worm.
462. Ordinary handspike, 60-pdr.
463. XI-inch shell bearer.
464. XI-inch worm.
465. 12-pdr. rifle passing box.
466. XI-inch scraper.
467. XI-inch scraper.
468. XI-inch rammer.
469. XI-inch woolen sponge.
470. XI-inch woolen sponge.
471. XI-inch bristle sponge.
472. XI-inch bristle sponge.
473. XI inch shell bearer.
474. 32-pdr. worm.
475. 32-pdr scraper.
476. 32-pdr. rammer.
477. 32-pdr. woolen sponge.
478. 32-pdr. bristle sponge.
479. 100-pdr. worm.
480. 100-pdr. rammer.
481. 24-pdr. ladle and worm connected.
482. Roller handspike, 32 pdr.
483. Ordinary handspike, 32-pdr.
484. Ordinary handspike, 32-pdr.
485. Dismounting bar, 12-pdr.
486. Rammer and sponge connected for 12-pdr. rifle, heavy.
487. Rammer and sponge connected for 3-inch breech-loading rifle.
488. Sponge bucket for 3-inch breech-loading rifle.
489. Sponge bucket for 3-inch breech-loading rifle.
490. Cartridges for 3-inch breech-loading rifle.
491. Cartridge cases for 3-inch breech-loading rifle.

CLASS G.—MODELS.

1. Model brass gun and carriage.
2. Model naval service gun.
2*a*. Model naval service gun.
2*b*. Model naval service gun.
2*c*. Model naval service gun.
2*d*. Model naval service gun.
2*e*. Model naval service gun.
2*f*. Model naval service gun.
3. Gun and carriage in port (wood model).
4. Gun and carriage (Tice) (wood model).
5. Gun and carriage (Marshall) (wood model).
6. Monitor gun and carriage (wood model).
7. Model brass gun and carriage.
8. Model brass gun and carriage.
9. Gun and carriage (model).
10. Port of the "Dunderberg" (wood model).
11. "Homby's" shot (wood model).
12. "Ferris's" shot (wood model).
13. "Warburton's" shot (wood model)
14. Shot (wood model).
15. "Spaulding's" shot (wood model).
16. "Beecher & Walker's" shot (wood model).
17. Shot (wood model).
18. "Binnix's" shot (wood model).
19. Shot (wood model).
20. Shot with 4 flanges in the rear (wood model).
21. Shot with 4 flanges in the rear (wood model).
22. Rifle shot (wood model).
23. IX-inch shot, service (wood model).
24. Serg't G. Dixon's shell (wood model).
25. 6.3-inch shell (wood model).
26. 60-pdr. shell, Lt. Com. Badger (wood model).
27. Darts.
28. Papier-maché sabots (Schenkl).
29. Broadside carriage (wood model).
30. Eccentric gun carriage (wood model)
31. Gun carriage (wood model).
32. Brass mortar and carriage (model).
33. Gun carriage (wood model).
34. "Marvilly" carriage (wood model).
35. Broadside gun carriage (wood model).
36. Gun carriage (wood model).
37. Gun and carriage (wood model).
38. XV-inch gun and carriage with loading gear (wood model).
39. Parrott gun and friction carriage (wood model).
40. Gun and carriage in turret (wood model).
41. Gun carriage (wood model).
42. Gun and carriage (wood model).
43. Gun and carriage (wood model).
44. Broadside gun and carriage (wood model).
45. Monitor, turtle (wood model).

SECTION I.—NAVAL ORDNANCE—Continued.

46. Naval gun (wood model).
46*a*. Naval gun (iron model).
47. 150-pdr. gun and carriage, Parrott (wood model).
48. Gun and carriage (wood model).
49. Magazine (tin model).
50. Furnace (wood model).
51. Gun and carriage in port (wood model).
52. Gun and carriage in port (Sawyer) (wood model).
53. Brass gun and truck carriage (model).
54. XI-inch pivot gun and carriage (model).
55. Broadside gun and carriage: improvement in closing and opening ports (wood model).
56. Model showing the plan of the "Ironsides" ports.
57. Plan for loading XV-inch gun (wood model)
58. Small brass mortar and carriage (model).
59. Gun and carriage (wood model).
60. Gun carriage (model by S. M. Pook).
61. Gun and carriage in port (wood model).
62. Monitor's turret (brass model).
63. Training truck with lever, pivot (wood model).

CLASS H.—RELICS.

1. This musket, while in the hands of John Holmes, a private marine on board the U. S. ship Constitution, in the action with the Cyane and Levant, December 20, 1815, was struck by a canister shot, passing through the barrel and knocking it out of his hands. A second musket which he took was also shot to pieces, and his hand shattered.
2. Cutlass, belonging to Capt. John Paul Jones, used on board the Bonhomme Richard.
3. Boarding cap.
4. Boarding cap.
5. Enfield rifle from the sunken monitor Keokuk.
6. Old boarding pike.
7. Board penetrated by a candle fired by Admiral Farragut from a musket at 10 paces.
8. Board penetrated by a candle fired by Admiral Farragut from a musket at 5 paces.
9. Leaf from Navy Department records, 1794, 1798.
10. Leaf from Navy Department records, 1794, 1798.
11. Leaf from Navy Department records, 1794, 1798.

CLASS J.—ORDNANCE PUBLICATIONS.

1. Gunnery Notes.
2. Laboratory Notes.
3. Naval Ordnance Papers—No. 1.
4. Naval Ordnance Papers—No. 2.
5. Naval Ordnance Papers—No. 3.
6. Naval Ordnance Papers—No. 4.
7. The French Mitrailleuse.
8. Divisional Course of Instruction.
9. Gunnery Instructions: Detail Drill.
10. Cutlass Drill.
11. Provisional Drill of Gatling Gun.
12. Notes on Reffye Gun.
13. Regulations for Powder Magazines and Shell Rooms.
14. Instruction—XI-inch Gun.
15. United Service Journal.
16. Naval Drill (Landing Drill).
17. Instruction and Care of Ammunition.
18. Dimensions and Weights of Gun Implements.
19. Use and Care of Gatling Gun.
20. Lecture on Galvanic Batteries—I and II.
21. Organization of Naval Brigade.
22. Vienna Exposition.
23. Zapata Chronograph.
24. Iron-clad Ships of the World: with plates.
25. Iron-clad Ships of the World; without plates.
26. Granulation of Powder.
27. Object and Resources of the Naval Experimental Battery.
28. Organization of Landing Parties.
29. Partial List of Cases involving Gross Carelessness.
30. Electric Position-Indicator or Distance-Measurer.
31. Ordnance Instructions.
32. Brandt's Catechism.
33. Manual of Navy Carbine.
34. Navy Pistol Drill.
35. Hints to Captains of IX-inch Guns.
36. The Art of Pointing Cannons, for Young Sea Officers
37. Phosphorus-Bronze for Founding Cannon.

SECTION I.—NAVAL ORDNANCE—Continued.

CLASS K.—TORPEDOES.

1. Lay torpedo.
2. Electric key-board and pedestal.
3. Ericsson torpedo.
4. Fish torpedo.
5. Harvey torpedo (port).
6. Harvey torpedo (starboard).
7. Towing torpedo (constructed at the U. S. Torpedo Station at Newport, R. I.).
8. Barber's torpedo.
9. Spar torpedo.
10. Spar torpedo (taken apart).
11. Spar torpedo.
12. Spar torpedo (taken apart).
13. Exercise torpedo.
14. Powder torpedo (steel).
15. Unloaded firing bolts.
16. Loaded firing belts.
17. Reel for electric cable.
18. Torpedo cable.
19. Torpedo supply box.
20. Farmer's dynamo-electric machine (large).
21. Firing key (Farmer).
22. Farmer's dynamo-electric machine (small).
23. Pneumatic battery.
24. Switch board.
25. Permanent wires.
26. Terminals.
27. Model showing method of fitting boat spar.
28. Circuit closer for ground torpedo.
29. Circuit closer for ground torpedo.
30. Circuit closer for ground torpedo.
31. Circuit closer for ground torpedo.
32. Circuit closer for ground torpedo.
33. Circuit closer for spar torpedo.
34. Fuzes and igniters.
35. Rubber torpedo (Beardsley).
36. Harvey torpedo towing reel.
37. Harvey torpedo tripping reel.
38. Electric key-board for ship's deck.
39. Torpedo publications:
    Torpedo Experiments.
    Report on Spar Torpedoes.
    Lecture on Movable Torpedoes.
    Notes on Torpedo Fuzes.
    Whitehead's Torpedo.
    Notes on Explosives.
    Lecture on Submarine Boats.
    Lecture on Galvanic Batteries.
    Liquid Carbonic Acid.
40. Plan of the U. S. Naval Torpedo Station, Goat Island, Newport Harbor, R. I. Scale: $\frac{1}{360}$.

CLASS L.

1. Apparatus to illustrate the action of the forces of projection and gravity in determining the trajectory of a shot. (Made for the Department of Physics and Chemistry, U. S. Naval Academy.)

CLASS M.—DRESSES OF SAILORS AND MARINES.

1. U. S. Marine, 1776.
2. U. S. Marine sergeant, 1876.
3. Seaman of the U. S. Navy, 1776.
4. Seaman of the U. S. Navy, 1876.
5. Seaman of the U. S. Navy, 1797.
6. Seaman of the U. S. Navy, 1798.
7. Seaman of the U. S. Navy, 1800.
8. Seaman of the U. S. Navy, 1805.
9. Seaman of the U. S. Navy, 1815.
10. Seaman of the U. S. Navy, 1816.
11. Seaman of the U. S. Navy, 1825.
12. Seaman of the U. S. Navy, 1835.

CLASS N.—POWDER.

1. Waffle powder (Du Pont).
   Specific gravity: 1.750.
   Granulation: 64 to 1 lb.
2. Register powder (Du Pont).
   Specific gravity: 1.750.
   Granulation: 72 to 1 lb.
3. Oriental Mills powder.
4. Cubical No. 1 powder (Schaghticoke).
   Specific gravity: 1.729.
   Granulation: 64.4 to 1 lb.
5. Prismatic powder (Washington navy-yard).
   Specific gravity: 1.750.
6. Experimental battery powder.
7. Powder (Hall, of Deptford).
8. Mammoth powder (Du Pont).
   Specific gravity: 1.716.
   Granulation: 72 to 1 lb.
9. Mammoth powder (Du Pont).
   Specific gravity: 1.760 to 1.720.
   Granulation: 82 to 1 lb.
10. Mammoth powder (Du Pont).
    Specific gravity: 1.679.
    Granulation: 45 to 1 lb.

SECTION I.—NAVAL ORDNANCE—Continued.

11. Mammoth powder (Du Pont).
    Specific gravity: 1.741.
    Granulation: 72 to 1 lb.
12. Mammoth powder (Du Pont).
    Specific gravity: 1.730.
    Granulation: 72 to 1 lb.
13. Mammoth powder (Du Pont.)
    Specific gravity: 1.753.
    Granulation: 113 to 1 lb.
14. Mammoth powder (Oriental Mills).
    Specific gravity: 1.769.
    Granulation: 109.7 to 1 lb.
15. Special powder for XI-inch guns (Du Pont).
    Specific gravity: 1.748 to 1.669.
    Granulation: 0.7×0.6.
16. Special powder for XI-inch guns (Du Pont).
    Specific gravity: 1.758.
    Granulation: 0.7×0.3
17. Special powder for XI-inch guns (Du Pont).
    Specific gravity: 1.738.
    Granulation: 0.2×0.3.
18. Special powder for XI-inch guns (Du Pont).
    Specific gravity: 1.774.
    Granulation: 0.7×0.3.
19. Rifle powder (Hazard Mills).
    Specific gravity: 1.732.
    Granulation: 0.5×0.3.
20. Cannon powder (Oriental Mills).
    Specific gravity: 1.754.
    Granulation: 0.4×0.5.
21. Musket powder (Oriental Mills).
    Specific gravity: 1.713.
    Granulation: 0.7×0.6.
22. Musket powder (Oriental Mills).
    Specific gravity: 1.713.
    Granulation: 0.6×0.4.
23. Small arms powder (Du Pont).
    Specific gravity: 1.723.
    Granulation: 0.7×0.2.
24. Explosive shell powder (Du Pont).
    Specific gravity: 1.724.
    Granulation: 0.6×0.8.

BUREAU OF NAVIGATION.

Commodore DANIEL AMMEN, *Chief of Bureau.*

SECTION II.—NAVIGATION.

CLASS A.—NAUTICAL AND SURVEYING INSTRUMENTS.

1. Chronometers: (Appendix No. 2.)
   - (*a*) Mean time chronometer (Bond No. 293).
   - (*b*) Mean time chronometer (Negus No. 917).
   - (*c*) Mean time marine chronometer (Negus No. 1593).
   - (*d*) Mean time marine chronometer (Negus No. 1447).
   - (*e*) Mean time marine chronometer (Negus No. 1595).
   - (*f*) Break circuit chronometer (Negus No. 1470).
   - (*g*) Break circuit chronometer (Negus No. 1591).
   - (*h*) Break circuit sidereal chronometer (Negus No. 1589).
   - (*i*) Mean time marine chronometer (Negus No. 1583).
2. Navy compasses. (Appendix No. 3.)
3. Hanging or cabin compasses. (Appendix No. 4.)
4. Navy boat compasses.
5. Azimuth circle and compass.
6. Azimuth circle. (Appendix No. 5.)
7. Turret or monitor compass. (Appendix No. 6.)
8. Old compasses of the navy. (Appendix No. 7.)
9. Compass testing instrument. (Appendix No. 8.)
10. Magnetic collimator. (Appendix No. 9.)
11. Adjustable binnacle for correcting the deviation of the compass. (Appendix No. 10.)
12. Ship's binnacle for steering compass.
13. Ship's binnacle on bronze stand for steering compass.
14. Gravitation compass (designed by the Earl of Caithness) and binnacle with adjustable magnets for correcting the deviation of the compass. (Appendix No. 11.)
15. Sextant (superior).
16. Sextant (ordinary).

Section II.—NAVIGATION—Continued.

17. Octant.
18. Quadrant.
19. Night octant.
20. Artificial horizon.
21. Spyglass (superior).
22. Spyglass (ordinary).
23. Binocular glass (superior).
24. Binocular glass (ordinary).
25. Micrometer.
26. Ektropometer.
27. Mercurial barometer.
28. Aneroid barometer.
29. Thermometer.
30. Hydrometer.
31. Theodolite.
32. Vernier compass.
33. Steel chain, 100 feet.
34. Steel chain, 50 feet.
35. Links and extra rings.
36. Arrows.
37. Metallic tape, 100 feet.
38. Standard measure, 10 feet.
39. Set of drawing instruments.
40. Roll and pitch self-registering indicator.

Class B.—Logs and Sounding Implements.

1. Registering log (Massey's).
2. Registering log (Trowbridge's).
3. Registering log (Walker's).
4. Registering log (Hotchkiss's).
5. Registering log (Reynolds's).
6. Log line.
7. Log reel.
8. Time glass (28 seconds).
9. Time glass (14 seconds).
10. Time glass (half-hour).
11. Time glass (60 seconds).
12. Deep sea sounding machine (designed by Sir William Thomson and modified by Captain G. E. Belknap, U. S. Navy). (Appendix No. 12.)

12b. Wooden model, Sir William Thomson's. (Appendix No. 13.)

13. Belknap's specimen cylinder No. 1. (Appendix No. 14.)
14. Belknap's specimen cylinder No. 2. (Appendix No. 15.)
15. Belknap's specimen cylinder No. 3. (Appendix No. 16.)
16. Belknap's specimen cylinder No. 4. (Appendix No. 17.)
17. Collins's detaching and specimen apparatus No. 1. (Appendix No. 18.)
18. Collins's detaching and specimen apparatus No. 2. (Appendix No. 18.)
19. Registering lead (Merrill's).
20. Registering lead (Trowbridge's).
21. Registering lead (Massey's).
22. Deep sea lead, 50 pounds, with Sand's specimen cup attached.
23. Hand lead, 7 pounds.
24. Hand lead, 9 pounds.
25. Hand lead, 14 pounds.
26. Hand lead, 25 pounds.
27. Deep sea lead, 100 pounds.
28. Deep sea lead, 80 pounds.
29. Deep sea lead, 50 pounds.
30. Hand lead line.
31. Coasting lead line.
32. Deep sea lead line (1¼ inch).
33. Deep sea lead line (1½ inch).
34. Deep sea lead line (1¾ inch).
35. Deep sea lead line reels.

Class C.—Lights.

1. Signal lantern, red.
2. Signal lantern, white.
3. Signal lantern, green.
4. Head lantern, common, white.
5. Side lantern, common, red.
6. Side lantern, common, green.
7. Head lantern (French), white.
8. Side lantern (French), red.
9. Side lantern (French), green.
10. Constant level lamp.
11. Capillary lamp.
12. Spring candlestick.
13. Hand lantern.
14. Dark deck lantern.
15. Storeroom lantern.
16. Hold and spirit-room lantern.
17. Standing light.
18. Moderator lamp, used in cabins and wardrooms.
19. Hydraulic lamp, used in cabins and wardrooms.
20. Single burner lamp, stand, and hook, used in cabins and wardrooms.
21. Double burner lamp, stand, and hook, used in cabins and wardrooms.
22. Coston night signal lights.
23. Navy blue lights.
24. Signal rockets.
25. Signal light discharger.

SECTION II.—NAVIGATION—Continued.

HYDROGRAPHIC OFFICE.

CLASS D.—CHARTS.

1. *Portfolio No.* 1.—Charts of the North Atlantic Ocean and islands; embracing east coast of Labrador to Cape Florida.
2. *Portfolio No.* 2.—Charts of the South coast of the United States; Florida Reefs; Bahama Banks and Channels; Windward Islands.
3. *Portfolio No.* 3.—Charts of Gulf of Mexico; Caribbean Sea and adjacent coast to the mouth of the Amazon.
4. *Portfolio No.* 4.—Charts of South Atlantic coast and islands from river Amazon to Cape Horn. From Equator on the coast of Africa to Cape of Good Hope.
5. *Portfolio No.* 5.—Charts of Southern Ocean and islands between their meridians; Great Britain, coasts, islands, &c.; English Channel, islands, and adjacent coasts; North Sea, and adjacent coasts.
6. *Portfolio No.* 6.—Charts of Skager Rack; Kattegat; Great and Little Belts; Baltic Sea; Gulfs of Bothnia and Finland, with adjacent coasts; west of France from Ouissant to Gibraltar; coast of Africa from Cape Spartel to the Equator; Mediterranean, Adriatic, Black, and Azof Seas, with adjacent coasts and islands.
7. *Portfolio No.* 7.—General charts of Pacific Ocean and islands; portion of Southern Ocean between its meridians.
8. *Portfolio No.* 8.—Charts of west and northwest coast of the United States; west coast of America from Cape Lisburne to Cape Horn; Sea of Kamtschatka to Cape Lopatka.
9. *Portfolio No.* 9.—Charts of Aleutian and other islands; Straits of Magellan; Okhotsk, Japan, and Yellow Seas, with adjacent coasts and islands; Cape Lopatka to Macao.
10. *Portfolio No.* 10.—Charts of China Seas; Indian Ocean; New Guinea, and other islands.
11. *Portfolio No.* 11.—Charts of Arctic Ocean, coasts, and islands; track-charts, wind, current, isothermal, and variation charts.
12. Plaster-of-Paris cast from the engraved plate of the chart of Savaii Island, Samoan Group. (Made at the U. S. Hydrographic Office, Washington, D. C.)
13. Plaster-of-Paris cast from the engraved plate of the map of the Hawaiian Islands. (Made at the U. S. Hydrographic Office, Washington, D. C.)
14. Sample of plate printing (U. S. Hydrographic Office, Washington, D. C.)
15. Plaster-of-Paris cast from the engraved plate of the chart of the Straits of Tsugar, Japan. (Made at the U. S. Hydrographic Office, Washington, D. C.)

CLASS E.—BOOKS.

1. Nautical books and sailing directions.
2. Library for a flag-ship.

CLASS F.—FLAGS AND BUNTING.

1. Pine Tree flag (1775–1776).
2. Pine Tree flag (1775–1776).
3. Grand Union flag (1776).
4. Union national flag (1777).
5. Union national flag (1795).
6. Union national flag (1818).
7. Union jack (1876).
8. National flag (1876).
9. Commodore's blue broad pennant (1776–1860).
10. Commodore's red broad pennant (1776–1876).
11. Commodore's white broad pennant (1776–1876).
12. Flag-officer's blue flag (1858–1866).
13. Flag-officer's red flag (1858–1866).
14. Flag-officer's white flag (1858–1866).
15. Union national flag (1815).
16. Flag of the Secretary of the Navy.
17. Admiral's flag (1866–1869).
18. Vice-admiral's flag (1866–1869).
19. Rear-admiral's blue flag (1866–1869).
20. Rear-admiral's red flag (1866–1869).
21. Rear-admiral's white flag (1866–1869)
22. Commodore's blue broad pennant (1866-1869).
23. Commodore's red broad pennant (1866-1869).
24. Commodore's white broad pennant (1866–1869).

SECTION II.—NAVIGATION—Continued.

25. Admiral's, Vice-Admiral's, and Rear-Admiral's flag (1869–1876) (Admiral's at the mainmast head, Vice-Admiral's at the foremast head, Rear-Admiral's at the mizzenmast head).
26. Admiral's barge flag.
27. Vice-admiral's barge flag.
28. Rear-admiral's barge flag.
29. Commodore's flag (at the mainmast head).
30. Commodore's boat flag.
31. Signal numeral flag No. 1.
32. Signal numeral flag No. 2.
33. Signal numeral flag No. 3.
34. Signal numeral flag No. 4.
35. Signal numeral flag No. 5.
36. Signal numeral flag No. 6.
37. Signal numeral flag No. 7.
38. Signal numeral flag No. 8.
39. Signal numeral flag No. 9.
40. Signal numeral flag No. 0.
41. Cornet.
42. First repeating flag.
43. Second repeating flag.
44. Third repeating flag.
45. Numeral flag.
46. Geographical flag.
47. Guard flag.
48. Church flag.
49. Answering pennant.
50. Preparatory pennant.
51. Interrogatory pennant.
52. Flag of the "Bonhomme Richard," under Captain John Paul Jones, Continental Navy.
53. Printed flag, made by the American Bunting Company.
54. Bunting testing apparatus. (Appendix No. 19.)
55. American manufactured bunting. (Appendix No. 20.)
56. Flag that inspired the writing of the "Star Spangled Banner." (Appendix No. 21.)

CLASS G.—OBSERVATORY PUBLICATIONS, ETC.

1. *Publications of the U. S. Naval Observatory:*
   - 2 vols. Astronomical, Magnetic, and Meteorological Observations, made by Lieut. J. M. Gilliss, U. S. Navy, 1838–1842.
   - 20 vols. Astronomical and Meteorological Observations made from 1845 to 1873.
   - 2 vols. Maury's Sailing Directions.
   - 1 vol. Zones of Stars observed at the Washington Observatory, 1846 to 1849.
   - 1 vol. Meteorological Observations, 1842 to 1867.
   - 1 vol. Catalogue of Stars observed from 1845 to 1871.
   - 1 vol. Catalogue of Stars observed in Præsepe; Solar Parallax from Observations of Mars; Orbit of Nemausa.
   - 1 vol. Latitude and Longitude of U. S. Naval Observatory; Investigation of the Distance of the Sun; Description of the Transit Circle; Positions of Fundamental Stars; Right Ascensions of Equatorial Fundamental Stars; Uranian and Neptunian Systems.
   - 1 vol. Report on Interoceanic Railroads and Canals.
   - 1 vol. November Meteors, 1866, '67, '68.
   - 1 vol. Report of Solar Eclipse of 1869.
   - 1 vol. Report of Solar Eclipse of 1870.
   - 1 vol. Differences of Longitude between Washington and Havana, and between Washington and Saint Louis.
   - 1 vol. Founding and Progress of the U. S. Naval Observatory.
   - 1 vol. Papers relating to the Transit of Venus of December 8–9, 1874.
   - 1 vol. Instruments and Publications of the U. S. Naval Observatory.
   - 1 vol. Awards to American Arctic Explorers Kane, Hayes, and Hall.
   - 1 vol. Catalogue of 1,963 Stars observed in the Southern Hemisphere.
   - 1 vol. Origin and Operations of the Naval Astronomical Expedition to the Southern Hemisphere.
   - 4 vols. U. S. Naval Astronomical Expedition to the Southern Hemisphere, by Lieut. James M. Gilliss, U. S. Navy.

SECTION II.—NAVIGATION—Continued.

1. *Publications of the U. S. Naval Observatory*—Continued.
    2. Photograph of the 26-inch refractor.
    3. Photograph of the 9.6-inch refractor.
    4. Photograph of the transit circle.
    5. Photograph of the transit instrument and mural circle.
    6. Photograph of a drawing of the planet Saturn, made by Mr. Trouvelot with the 26-inch refractor.
    7. Annular nebula, drawn by Prof. E. S. Holden, with the 26-inch refractor of the Naval Observatory, Washington.
    8. Photograph of a drawing of the nebula M. 17, made by Mr. Trouvelot with the 26-inch refractor.
    9. Photograph of a drawing of the nebula of Orion, made by Mr. Trouvelot with the 26-inch reractor.
    10. Apparatus for determining personal equation in astronomical observations (Prof. J. R. Eastman). (Appendix No. 22.)
    11. Heliotype of the 26-inch refractor.
    12. Heliotype of the 9.6-inch refractor.
    13. Heliotype of the transit circle.
    14. Heliotype of the transit instrument and mural circle.

CLASS II.—U. S. TRANSIT OF VENUS EXPEDITIONS.

1. Equatorial house.
2. Transit house.
3. Photographic house.
4. Equatorial telescope.
5. Transit instrument.
6. Striding level.
7. Hanging level.
8. Electric chronograph.
9. Apparatus for determining difference of longitude by telegraph.
10. Heliostat and lens.
11. Plate-holder.
12. Chemicals and apparatus used in taking solar photographs.
13. Portable declinometer, with theodolite.
14. Dip circle.
15. Astronomical clock, mounted on field stand. (Appendix No. 23.)

CLASS J.—AMERICAN ARCTIC EXPLORATIONS.

1. Boat Faith of first and second Grinnell expeditions; one of the three which, in 1855, on abandoning the Advance, Kane pushed, with their stores, over the ice, 80 miles south to the open sea, and thence made 1,000 miles to Disco Brought home by Captain Hartstene, U. S. N.
2. Boat of the Polaris, in which the part of the crew which abandoned her June 3, 1873, were rescued off Cape York, in August, by the Ravenscraig.
3. Sledge like that on which Captain Hall made his last journey north from Thank God Harbor to latitude 82° 3′, October 10 to 24, 1871. (Made by the Esquimaux Joe Ebierbing)
4. Bust of Elisha K. Kane, assistant surgeon U. S. Navy.

    (Born at Philadelphia, Feb. 3, 1820.
    May, 1843, naval surgeon to U. S. Chinese embassy.
    May, 1850, surgeon and naturalist of Lieutenant De Haven's first Grinnell Arctic expedition.
    1853 to 1855, conducted the second Grinnell expedition.
    Died in Havana February 16, 1857.)
5. Furs worn by Dr. Kane in his Arctic expedition, 1853–'55.
6. Dr. Kane's rifle.
7. Dr. Kane's kayak.
8. Walrus head.
9. Runners and bars of Sir John Franklin's sled.
10. Piece of the boat of Sir John Franklin.
11. Dr. Kane at the graves of Franklin's men.
2. Chart showing the track of the Advance and the rescue.
13. The discoveries north of Smith's Sound by the Polaris, 1871. (Capt. C. F. Hall.)
14. Track of the Polaris; drift of the ice-floe party.
15. Map made by Joe Ebierbing.
16. Map made by C. F. Hall for his "Arctic Researches."
17. Progress of American Discovery. (Kohl.)

SECTION II.—NAVIGATION—Continued.

18. The Panther in Melville Bay. (Bradford's Expedition, 1869.)
19. The glacier of Sermitsialik, South Greenland. (Bradford's expedition, 1869.)
20. Castled iceberg in Melville Bay. (Bradford's Expedition, 1869.)
21. Fiskernaes, Greenland. ("Narrative of the Polaris.")
22. Lichtenfels, Greenland. ("Narrative of the Polaris.")
23. Holsteinborg, Greenland. ("Narrative of the Polaris.")
24. Tissiusak, Greenland. ("Narrative of the Polaris.")
25. Upernavik, Greenland. ("Narrative of the Polaris.")
26. Cape Lupton. ("Narrative of the Polaris.")
27. Ravine near Thank God Harbor. ("Narrative of the Polaris.")
28. Boat camp, Newman's Bay, July, 1872. ("Narrative of the Polaris.")
29. Leaving Thank God Harbor, August 12, 1872. ("Narrative of the Polaris.")
30. The boats at Hakluyt Island, June 4, 1873. ("Narrative of the Polaris.")
31. Arctic scene. (Kane and Hamilton.)
32. Arctic scene. (Kane and Hamilton.)
33. Arctic scene. (Kane and Hamilton.)
34. Arctic scene. (Kane and Hamilton.)
35. Arctic scene. (Kane and Hamilton.)
36. Arctic scene. (Kane and Hamilton.)
37. Captain Tyson's boat, prepared for its northern journey.
38. The house on the ice-floe, October, 1872.
39. Thank God Harbor.
40. Passing Fitz-Clarence Rock, August 26, 1871.
41. Sighting the Ravenscraig off Cape York, June 23, 1873.
42. U. S. steamer Polaris on Providence Bay, spring, 1872.

(Objects on the northeast side of case.)

I.—Expedition of Lieut. E. J. De Haven. (First Grinnell Expedition, 1850–'52.)

1. Soup canister from Franklin's first winter quarters.
2. Red snow from the cliffs of Beverly.
3. "The First U. S. Grinnell Expedition." By E. K. Kane, M. D.

II.—Expedition of Dr. Kane, 1853–'55.

1. Flag of the Advance.
2. Journals of Kane. 2 vols.
3. Transit instrument of Kane.
4. Sextant of Kane.
5. Prismatic compass of Kane.
6. Spyglass of Kane.
7. Portfolio of Arctic sketches.
8. Twelve Arctic scenes in oil colors.
9. Forty-eight Arctic scenes in water colors.
10. Ten daguerreotypes.
11. Copy of Tennyson (read to his men).
12. "Arctic Explorations," 1853–'55.
13. "Arctic Boat Journey." Dr. I. I. Hayes.
14. Photographs of medals awarded to Kane, viz, from the Royal Geographical Society, London; from the Geographical Society of Paris; from British residents in New York City; from the State of New York, and "The Queen's medal."
15. Electrotype of medal from the Geographical Society of Paris.
16. Kane's Miscellanies. 2 vols.
17. Photograph of Kane.
18. Daguerreotype of Kane.
19. Daguerreotype of Kane in furs.
20. Daguerreotype of Kane in uniform of assistant surgeon U. S. Navy.
21. Kane medallion.
22. Stones collected by Morton at the most northern headland reached.
23. Small kayak.
24. Knife made from the relics of Sir John Franklin's expedition.
25. Photograph of the vase presented by the British Government, "as a token of their sincere gratitude and esteem, to Henry Grinnell, of New York, through whose exertions and munificence the American Arctic expeditions in search of Sir John Franklin and the officers and crews of Her Britannic Majesty's ships Erebus and Terror were undertaken and carried into execution, between the years 1850–'53."
26. Photograph of William Morton.

27 and 28. Medals awarded to Mr. Amos Bonsall, viz:

27. "The Queen's medal."

SECTION II.—NAVIGATION—Continued.

28. Medal from the British Government to the officers and men engaged in the American Arctic expeditions.
29. The American Geographical Society honoring Kane's memory. Vol. for 1856.
30. "Medals awarded to American Arctic explorers."

(Objects on the northwest side of case.)

III.—Expedition of Dr. I. I. Hayes, 1860–'61.

1. "The Open Polar Sea." Dr. I. I. Hayes.
2. Syenite from the most northern point reached.
3. Electrotype of medal awarded to Dr. Hayes by the Geographical Society of Paris.

IV.—First Expedition of Capt. C. F. Hall.

1. Notes of Journey to Countess of Warwick Sound.
2. Covers for notes.
3. Writing tablets
4. Pen-holder. Dipping needle.
5. Bottle of mercury.
6. Sledge log, line and reel.
7. Boat log.
8. Bag for compass.
9. Tape measure.
10. Canvas drinking cup.
11. Skillings and mud from Holsteinborg.
12. Rock from Kodluma Island.
13. Fool's gold and fossils from Frobisher's Bay.
14. Case for spyglass.
15. Fragments of rock and brass knob from Field's Bay.
16. "Arctic Researches." C. F. Hall, 1862.
17. Photograph of Hall, with autograph.
18. Electrotype of medal from Geographical Society of Paris.
19. Garnets from Kingguite.
20. Mica from Niometelik.
21. Musk-ox horns.
22. Gloves and button.
23. Graphite (lat. 67° 30′, long. 68° 41′).
24. Minerals from Rescue Bay. (Frobisher's Bay Expedition.
25. Journal kept from 1860 to 1862.
26. Picture of Esquimaux dog.

27. Box carried by Hall on his second expedition.
28. Minerals collected by Hall ("Meta incognita" of Frobisher).
29. U. S. flag borne on the Peacock by Captain Wilkes to the South Seas, and by De Haven, Kane, Hayes, and Hall to the Arctic Seas.
30. Whale chart prepared by Lieut. M. F. Maury at the Naval Observatory, 1851; used by Hall.
31. Addresses of Hall and Henry Grinnell before the American Geographical Society of New York. (Journal of the Society.)

(Objects on the southwest side of case.)

V.—Second Expedition of Capt. C. F. Hall, 1864–'69.

1. Flag of the expedition.
2. Note box.
3. Long saber used on King William's Land.
4. Seal spear.
5. Hall's notes.
6. Brass writing plates, heated to prevent ink from freezing.
7. Shot used by Hall.
8. Rib of spotted seal.
9. Musk-bull tooth.
10. Seal tooth and walrus tooth.
11. Reindeer horns.
12. Esquimaux kayak.
13. Cord from the British ship Resolute.
14. Quartz from Marble Island.
15. Minerals from Repulse Bay.
16. Minerals from Amherst Island.
17. Journal of second expedition.
18. Minerals from Gifford River and from Fury and Hecla Strait.

Relics of Parry's Expedition. (Brought back by Hall.)

19. Wood and oakum; wood of Parry's flagstaff. (Igloolik.)
20. Pieces of tent; rope yarn; oilcloth; canvas; shot; beads; iron. (Igloolik).

Relics of Capt. James Ross's Expedition, 1829–'33. *(Brought back by Hall.)*

21. Pieces of riveted and hoop iron; shot.

SECTION II.—NAVIGATION—Continued.

Relics of Dr. Rae's Expedition, 1845-'47. (Brought back by Hall.)

22. Pieces of wood, iron, canvas, clay pipe, from near Fort Hope.

Articles belonging to Joe Ebierbing and Hannah.

23. Sealskin coat.
24. Map made by Joe.
25. Innuit ladies' boots.
26. Skin of a deer shot by Hannah.
27. Skin of a musk-ox shot by Hannah.
28. Shoes worn by Hannah's child Sylvia.

Relics of Sir John Franklin's Expedition, 1845. (Brought back by Hall.)

1. Silver watch cases; silver fork; table, desert, and tea spoons; scissors.
2. Piece of azimuth compass; tin vessel for records.
3. Brass tubing; gimlet; knob; bullet; cylindrical lead.
4. Needle; button of naval uniform; coat lining.
5. Barometer.
6. Britannia dish; pickle jar worn by ice or snow.
7. Bottle containing hair and fragments of clothing of Franklin's men.
8. Piece of chair from Franklin's vessel.
9. Probe, file, and strip of copper.
10. Instrument box; piece of desk.
11. Arrows.
12. Arrowters (snow-beaters).
13. Sledge bars.
14. Wedge, chisel, wood (Repulse Bay, Whale Point, Fox Channel).
15. Canisters of roast beef and carrots.
16. Canvas; wood from Gifford River.

William Bradford's Expedition in the Panther, 1869.

1. Photographs of Arctic scenery.
2. "The Land of Desolation."

(Objects on the southeast side of case.)

VI.—Third Expedition of Capt. C. F. Hall. (The Polaris, 1871.)

1. Log of the Polaris.
2. Journal of Capt. S. O. Budington.
3. Rough log of the scientific corps.
4. Journal of R. W. D. Bryan, astronomer of the Polaris; of H. Siemans; of J. B. Mauch; of John Herron; of H. Hobby.
5. Sketches by E. Schumann, engineer.
6. Plan of the Polaris as fitted for the Arctic Expedition by Naval Constructor B. F. Delano.
7. The Polaris at the Washington navy-yard, June, 1871.
8. Hall's inkstand.
9. Tip of a walrus tusk.
10. Note-book used by Captain Hall in his last sledge-journey, October 10, 1871.
11. Photograph of Joe Ebierbing.
12. Photograph of Hannah.

Articles belonging to Capt. G. E. Tyson.

13. Note books containing his diary kept on the ice from October, 1872, to April, 1873; cover; pencil.
14. Walrus tusk.

Articles belonging to R. W. D. Bryan, astronomer of the Polaris.

15. Shotgun.
16. Celsius and Fahrenheit thermometers.
17. Pieces of the flag of the Polaris.
18. Sealskin mittens used while observing; cap; eider-down wristlets; watch-guard.
19. Bag of tobacco and of tea used while in the boats; coins; ivory articles manufactured by Etah Esquimaux; brass tokens marked "Christmas, 1871—latitude 81° 38'."
    Chronometer key; stone with lichens; fossils from Thank God Harbor; hair from the tips of whalebone slabs; oil silk for records; pipe.
20. *Collection of minerals and fossils by Dr. Emil Bessels, chief of the scientific corps of the Polaris Expedition* (79 *specimens*).
21. Earth from Hall's grave.
22. Hall's grave.
23. Arctic flora.
24. Landing stores from the Polaris on the ice.
25. The Polaris before separating from the ice-floe party.
26. Boat camp, June, 1873.

SECTION II.—NAVIGATION—Continued

Articles brought back to the United States on the U. S. S. Juniata (relief ship).

1. The Little Juniata on her cruise to Cape York.
2. Model of kayak.
3. Danish book—pictures drawn by Esquimaux.
4. Esquimaux sealskin suit.
5. Sealskin coat.
6. Hunting gear; dog harness and whips.
7. Esquimaux baby; sled.
8. Walrus tusk.
9. Seal spear.
10. Specimen of Greenland work.
11. Lead ore.
12. Coal.
13. Mica.

Articles brought back on the U. S. S. Tigress (relief ship), 1873.

14. Sealskin frock and hood; boots; women's pants.
15. Log of the Tigress.

Articles brought to the United States on the U. S. S. Congress.

16. Sealskin coat, pants, boots, child's shoes.
17. Water cask.
18. Kayak, with 6 dressed figures.
19. Kayak, with 1 figure.
20. Cane of narwhal's horn, the head of walrus tooth.

CLASS K.—NAUTICAL ALMANAC PUBLICATIONS.

1. The American Ephemeris and Nautical Almanac for the years 1855 to 1878. 24 vols.
2. The Almanac for the Use of Navigators for the years 1876 to 1879. 4 vols.
3. Tables of the Moon.
4. Tables of Mercury and Venus.
5. Tables of Melpomene, Economia, Harmonia, and Parthenope.
6. Star Tables of the American Ephemeris.

CLASS L.—RELICS.

Relics of Capt. Paul Jones, of the Continental Navy.

1. Chart—Cooke and Clerke.
2. Part of chart of the world, 1768–'80.
3. Atlas to Vancouver's Voyage.
4. Loose leaves with drawings attached to them, and two loose drawings.
5. Capt. John Paul Jones's log-book, 1779–'82.
6. Dutch official copy of the flags borne by Jones's ships while in the Texel, October, 1779.
7. Official copy of John Paul Jones's commission.
8. Fac-simile of John Paul Jones's commission.
9. Blank commission of John Paul Jones, signed by John Hancock, President of the Continental Congress.
10. Journal of the French fleet, 1781–'82, while under the command of Count de Grasse.

BUREAU OF EQUIPMENT.

CAPT. R. W. SHUFELDT, *Chief of Bureau.*

SECTION III.—EQUIPMENT.

CLASS A.—GALLEYS, ETC.

1. Ship's galley for 500 men, with utensils, complete.
2. Ship's galley for 200 men, with utensils, complete.
3. Model of a boat with Lieutenant Wood's gear for lowering, hoisting, and securing boats, and apparatus for detaching and attaching them. (Appendix No. 24.)

CLASS B.—ROPE.

1. Russia hemp hawser (24 inches). Breaking strain, 280,000 pounds.
2. Manila rope (4 strands, 6 inches). Breaking strain, 24,000 pounds.
3. Russia hawser (6 inches). Breaking strain, 24,000 pounds.
4. Manila hawser (6 inches). Breaking strain, 20,000 pounds.

SECTION III.—EQUIPMENT—Continued.

5. **Russia hemp rope (tarred, 4 strands, 6 inches). Breaking strain, 28,800 pounds.**
6. **Manila hawser (5 inches). Breaking strain, 20,000 pounds.**
7. **American hemp rope (tarred, 4 strands, 4 inches). Breaking strain, 16,200 pounds.**
8. **Manila rope (4 strands, 5 inches). Breaking strain, 16,700 pounds.**
9. **Russia hemp rope (tarred, 4 strands, 5 inches). Breaking strain, 20,000 pounds.**
10. **Manila rope (4 strands, 4 inches). Breaking strain, 10,700 pounds.**
11. **American hemp rope (tarred, 3 strands, 5 inches). Breaking strain, 22,500 pounds.**
12. **Russia hawser (4½ inches). Breaking strain, 13,400 pounds.**
13. **Manila rope (3 strands, 5 inches). Breaking strain, 14,000 pounds.**
14. **Manila hawser (4 inches). Breaking strain, 10,700 pounds.**
15. **American hemp rope (tarred, 3 strands, 4 inches). Breaking strain, 14,400 pounds.**
16. **Manila rope (3 strands, 4 inches). Breaking strain, 10,700 pounds.**
17. **Manila rope (4 strands, 3 inches). Breaking strain, 8,200 pounds.**
18. **Russia hemp rope (tarred, 4 strands, 3 inches). Breaking strain, 7,200 pounds.**
19. **Manila rope (3 strands, 3 inches). Breaking strain, 6,000 pounds.**
20. **American hemp rope (tarred, 3 strands, 3 inches). Breaking strain, 7,200 pounds.**
21. **Manila rope (4 strands, 3½ inches). Breaking strain, 8,200 pounds.**
22. **Russia hemp rope (tarred, 4 strands, 2½ inches). Breaking strain, 5,000 pounds.**
23. **Manila rope (3 strands, 2½ inches). Breaking strain, 4,000 pounds.**
24. **American hemp rope (tarred, 3 strands, 2 inches.) Breaking strain, 3,200 pounds.**
25. **Manila rope (3 strands, 2 inches). Breaking strain, 2,700 pounds.**
26. **Manila rope (3 strands, 1½ inches). Breaking strain, 1,700 pounds.**
27. **American hawser (5 inches). Breaking strain, 16,700 pounds.**
28. **Hide rope (4 strands, 6 inches).**
29. **Manila line rope (18 thread).**
30. **American hemp line (untarred, 15 thread).**
31. **Manila rope (3 strands, 1¼ inches).**
32. **American hemp line (untarred, 6 thread).**
33. **American hemp line (untarred, 18 thread).**
34. **Manila line (12 thread). Breaking strain, 800 pounds.**
35. **American hemp line (untarred, 12 thread).**
36. **American hemp line (untarred, 9 thread).**

CLASS C.—WIRE ROPES.

1. **Wire rope (6 inches).**
2. **Steel-wire hawser (4¾ inches).**
3. **Wire rope (5 inches).**
4. **Wire rope (4 inches).**
5. **Wire rope (3½ inches).**
6. **Wire rope (3 inches).**
7. **Wire rope (2½ inches).**
8. **Wire wheel rope (2 inches).**
9. **Wire rope (2 inches).**
10. **Wire rope (1½ inches).**
11. **Wire rope (1¼ inches).**
12. **Wire rope jib net (⅝ inch).**
13. **Copper-wire lightning conductor.**

CLASS D.—CHAINS, SHACKLES, BUOYS, ETC.

1. **Jew's harp.**
2. **Club link and shackle.**
3. **Devil's claws.**
4. **Mooring swivel.**
5. **Mooring swivel.**
6. **Swivel.**
7. **Swivel.**
8. **Fish-hook for anchor.**
9. **Boat anchor.**
10. **Boat anchor.**
11. **Club link and shackle.**
12. **Drying stove.**
13. **Grapnel.**
14. **Grapnel.**
15. **Grapnel.**
16. **Grapnel.**
17. **Grapnel.**
18. **Grapnel.**

SECTION III.—EQUIPMENT—Continued.

19. Rigger's screw.
20. Anchor buoy.
21. Kedge buoy.
22. Relieving cushion.
23. Dead eye.
24. Relieving cushion.
25. Dead eye.
26. Hose basket.
27. Stop-cock.
28. Brass belaying pins.
29. Iron belaying pin.
30. Sail prickers.
31. Splicing fids.
32. Hose coupling.
33. Hose clamps.
34. Hose pipe.
35. Link mooring chain.
36. Pickax and hoe.
37. Hammock fitted with clews and lashings.
38. Lightning conductor spindle.
39. Setting fids.
40. Carpenter's slings.
41. Clothes bag.
42. Marline spikes.
43. Set of chain links.
44. Shackles connected with boat chain ($\frac{5}{16}''$).
45. Samples of rigging chain.
46. Set of hooks and thimbles.
47. Set of sister-hooks.
48. Set of sail clews.
49. Boat stove complete.
50. Mess cloth.
51. Hospital cot.
52. Set of rigging thimbles.
53. Water bag.
54. Set of sailmaker's thimbles.
55. Set of composition thimbles.
56. Chain hooks.
57. Cork jacket.
58. Specimens of chain iron broken in testing at Washington navy-yard.
59. Model of a link-bending machine for bending iron chain cable links, tackle hooks, connecting shackles, &c. (In use at the navy-yard, Washington, D. C.)

    Photograph of the machine. Printed report of the Naval Committee of the House of Representatives, February 11, 1870.

    12 leaden links to be used in model, showing the mode of working the machine.

59. Model of a link-bending machine &c.—Continued.

    5 chain cable links ($2\frac{3}{4}''$, $2\frac{1}{2}''$, $2''$, $1\frac{1}{2}''$, $1''$).

    3 connecting shackles ($2\frac{1}{8}''$, $1\frac{1}{2}''$, $1''$).

    6 links of rigging chain ($\frac{9}{16}''$, $\frac{7}{16}''$, $\frac{6}{16}''$, $\frac{5}{16}''$, $\frac{4}{16}''$, $\frac{3}{16}''$).

    7 tackle hooks ($2\frac{1}{4}''$; $2\frac{1}{2}''$, $1\frac{5}{8}''$, $1\frac{1}{4}''$, $1''$, $\frac{3}{4}''$, $\frac{5}{8}''$).

CLASS E.—CANVAS.

1. Flax canvas, No. 1.
2. Flax canvas, No. 2.
3. Flax canvas, No. 3.
4. Flax canvas, No. 4.
5. Flax canvas, No. 5.
6. Flax canvas, No. 6.
7. Flax canvas, No. 7.
8. Flax canvas, No. 8.
9. Flax canvas, No. 9.
10. Cotton canvas, No. 1.
11. Cotton canvas, No. 2.
12. Cotton canvas, No. 3.
13. Cotton canvas, No. 4.
14. Cotton canvas, No. 5.
15. Cotton canvas, No. 6.
16. Cotton canvas, No. 7.
17. Cotton canvas, No. 8.
18. Cotton canvas, No. 9.
19. Cotton canvas, No. 10.
20. Light cotton canvas (Raven's).
21. Heavy cotton canvas (Raven's).
22. Bag canvas.
23. Cot canvas.
24. Hammock canvas.

CLASS F.—HOISTING GEAR.

1. Tackle and runner (1 to 4).
2. Single Spanish burton (1 to 3).
3. Double Spanish burton (1 to 5).
4. Burton (1 to 9).
5. Water whip (1 to 2).
6. Topsail halyards (1 to 10).
7. Lift jigger (1 to 3).
8. Burton (1 to 8).
9. Watch tackle (1 to 3).
10. Bell purchase (1 to 8).
11. Whip (1 to 1).
12. Whip (1 to 2).
13. Whip and runner (1 to 2).
14. Gun tackle purchase (1 to 2).
15. Rigging luff (1 to 3).
16. Luff tackle (1 to 3).
17. Double purchase (1 to 4).
18. Old jeer purchase (1 to 5).

19. Top burton (1 to 3).
20. Sail tackle (1 to 5).
21. Royal halyard purchase (1 to 2).
22. Burton (1 to 16).

CLASS G.—TESTS OF IRON.

1. Section of connecting rod of hydraulic chain-proving machine at the navy-yard, Washington. In use thirty-five years, and subjected to strains equal to 300,000 pounds, and to recoils incidental upon the rupture of the test specimen. Illustrating the action of strains and vibrations in producing crystallization.

2. Coarse granulous iron, of fair tensile strength, but with slight transverse strength, and no resilience. Specimens broke by blows of from 300 to 500 pounds delivered on a scored circle with a wedge-shaped hammer. This iron is unsuitable for any purpose where it is exposed to sudden or transverse strains.

3. Chain iron made from condemned scrap iron by a process discovered by Commander L. A. Beardslee, U. S. N. These specimens were broken by from three to six blows, of 3,000 pounds each, with a wedge-shaped testing hammer.

4. Test of bars of same iron as No. 3. This lot of iron not scored; struck in the center from eight to fifteen 3,000-pound blows; then closed under an 8-ton steam hammer.

5. Tests of 1¼-inch bars made by Commander L. A. Beardslee's process. All bent to their present shape by heavy blows. The piece tied into an overhand knot was pointed while hot, then allowed to cool, and hauled taut by tension. The screw bolts were struck in the center, the bearings being placed at junction of the threads with a solid iron.

6. Collection of ends of bars of various makers which have been broken off by sledge blows after having been nicked with cold chisel, the highest number of blows struck being one hundred and nineteen, and the lowest number of blows one.

7. 3-inch bar of Burden B. B. (best bar) iron, bent cold by blows of an 8-ton steam hammer.

8. 3-inch bar of Burden B. B. (best bar) iron, scored $\frac{1}{16}$ inch deep, and broken by seventeen blows of 4,500 pounds each.

9. Bars of Burden B. B. (best bar) iron, pulled asunder by hydraulic power, illustrating the increase of tensile strength and elastic limit per square inch as the bar decreases in diameter. The average elongation is 23 per cent., and the average contraction of area 45½ per cent.

(*a*) 2-inch bar: Elastic limit 24,480 pounds per square inch; tensile strength 47,687 pounds per square inch.

(*b*) 1⅞-inch bar: Elastic limit 21,068 pounds per square inch; tensile strength 49,089 pounds per square inch.

(*c*) 1¾-inch bar: Elastic limit 26,640 pounds per square inch; tensile strength 49,714 pounds per square inch.

(*d*) 1⅝-inch bar: Elastic limit 31,050 pounds per square inch; tensile strength 50,912 pounds per square inch.

(*e*) 1½-inch bar: Elastic limit 32,910 pounds per square inch; tensile strength 51,455 pounds per square inch.

(*f*) 1⅜ inch bar: Elastic limit 32,400 pounds per square inch; tensile strength 52,854 pounds per square inch.

(*g*) 1¼-inch bar: Elastic limit 29,700 pounds per square inch; tensile strength 51,989 pounds per square inch.

(*h*) 1⅛-inch bar: Elastic limit 28,260 pounds per square inch; tensile strength 52,153 pounds per square inch.

(*j*) 1-inch bar: Elastic limit 28,800 pounds per square inch; tensile strength 52,698 pounds per square inch.

SECTION III.—EQUIPMENT—Continued.

9. Bars of Burden B. B. iron, &c.—Continued.

   (*k*) 2¼-inch bar: Elastic limit 24,200 pounds per square inch; tensile strength 47,600 pounds per square inch.

   (*l*) 2½-inch bar: Elastic limit 23,600 pounds per square inch; tensile strength 47,000 pounds per square inch.

10. Set of turned cylinders of *Tamaqua* iron, tested to ascertain the proper form of test-piece. They are all from the same bar, and of various lengths, from 10 inches down to the groove form; they show a difference in tensile strength of nearly 16,000 pounds, between the average of the pieces above four diameters in length, and the groove form.

    (*a*) 10-inch piece: tensile strength 54,888 pounds, seamy.

    (*b*) 9½-inch piece: tensile strength 55,288 pounds.

    (*c*) 9-inch piece: tensile strength 55,355 pounds.

    (*d*) 8½-inch piece: tensile strength 55,622 pounds.

    (*e*) 7½-inch piece: tensile strength 54,890 pounds, seamy.

    (*f*) 7-inch piece: tensile strength 55,488 pounds.

    (*g*) 6½-inch piece: tensile strength 51,800 pounds, bad seam.

    (*h*) 6-inch piece: tensile strength 55,418 pounds.

    (*j*) 5½-inch piece: tensile strength 55,333 pounds.

    (*k*) 4-inch piece: tensile strength 55,887 pounds.

    (*l*) 3½ inch piece: tensile strength 55,482 pounds.

    (*m*) 3-inch piece: tensile strength 56,190 pounds.

    (*n*) 1-inch piece: tensile strength 58,933 pounds.

    (*o*) ½ inch piece: tensile strength 59,388 pounds.

    (*p*) Groove piece: tensile strength 71,300 pounds.

11. Set of turned cylinders of *Pembroke* rivet iron, illustrating the proportions of test-pieces to be used with a soft iron. In this set the average tensile strength of the pieces above five diameters in length was 46,000 pounds per square inch; that of the groove specimen, 61,000 pounds; a difference of 15,000 pounds per square inch.

    (*a*) 8-inch piece: tensile strength 45,800 pounds.

    (*b*) 7-inch piece: tensile strength 45,930 pounds.

    (*c*) 6-inch piece: tensile strength 45,995 pounds.

    (*d*) 5-inch piece: tensile strength 45,768 pounds.

    (*e*) 4-inch piece: tensile strength 46,561 pounds.

    (*f*) 3-inch piece: tensile strength 46,759 pounds.

    (*g*) 2-inch piece: tensile strength 46,734 pounds.

    (*h*) 1-inch piece: tensile strength 47,033 pounds.

    (*j*) Groove piece: tensile strength 61,023 pounds.

12. Four pieces turned from a 2-inch bar of *Catasauqua* iron, and tested to ascertain the difference due to variation of the sectional area of the test-piece. The large pieces (1¼ inches in diameter) broke at 49,500 pounds per square inch, and the small ones (½ inch in diameter) broke at 49,850 pounds per square inch.

13. Collection of cable links broken by tension, showing the different characters of breaks of iron suitable for chain cables.

14. Cable links broken by tension, showing iron unfit for chain cable.

15. Cylinder test-pieces, giving their shape before and after straining to tensile limit.

SECTION III.—EQUIPMENT—Continued.

16. Sections of rigging chain broken by tension (sizes, ¼, ⅜, ½, ⅝, and ¾ inch).
17. Two bars that were subjected to tension, which broke in the eyes and were found to be contracted in area at other points than at the break. The eyes were repaired, and the specimens broke at higher strains, at points not previously contracted.
18. Bar of stiff hard iron, of high tensile strength, but not suitable for standing sudden shocks or to make chain cable.
19. Three bars of good iron from *Pembroke* Mills, which have been tested by impact.
20. Lever and catch designed and used for conveying a sudden strain to test-pieces.

BUREAU OF YARDS AND DOCKS.

Commodore JOHN C. HOWELL, *Chief of Bureau*.

SECTION IV.—YARDS AND DOCKS.

CLASS A.—DRY DOCKS.

1. Model of dry-dock, U. S. navy-yard, Brooklyn, N. Y.
   Commenced August, 1841; completed August, 1851; length, 350 feet; breadth, 66 feet; draft of water, 25 feet; capacity, 7,000 tons; material, granite; weight of turning gates, 187 tons; weight of caisson, 217 tons; cost of caisson, $79,500; cost of dock, including pumping engine and caisson, $2,000,000.
2. Model of the stone dry-dock being constructed at the U. S. navy-yard, Mare Island, California.
   Principal dimensions: Extreme length of dock over all, 525 feet 9 inches; length of floor on line of keel blocks from inside of caisson, 440 feet; length on floor from face of invert to first altar, 418 feet; length of invert, 41 feet; length of invert and apron, 48 feet 9 inches; width of invert at coping, 78 feet; width of floor, 30 feet; inside width of dock at coping, 104 feet; depth of water on invert at mean high tide, 27 feet 6 inches; depth of water on floor at invert, 32 feet.
3. U. S. naval dry-dock at Norfolk, Va.
   Cost, $943,676.73. Dimensions: Extreme length at top, 322 feet; width at bottom, 30 feet; width at top, 86 feet; commenced December 1, 1827; John Q. Adams, President of the United States; Samuel L. Southard, Secretary of the Navy. Authorized by the Nineteenth Congress. Opened June 17, 1833, Andrew Jackson, President of the United States; Levi Woodbury, Secretary of the Navy; Laomi Baldwin, engineer. Scale of model, 8 feet to 1 inch.
4. Dry-dock, navy-yard, Boston.
   Commenced July 10, 1827; opened June 24, 1833; cost, $677,090; lengthened 65 feet in 1857-'58-'59; extreme length on coping, 402.8 feet; width on coping, 99.7 feet; width of coping on main arch, 60 feet; depth from top of coping to floor of chamber at the head, 30.9 feet; depth from top of coping to floor of chamber at the galleries, 32 feet; length of floor of chamber, 293 feet.

CLASS B.—PIECES OF VESSELS.

1. These blocks were made from parts of the undermentioned vessels-of-war while under repair or being broken up, with the dates at which each one was commenced to be built:

   Florida, 1861.
   Cumberland, 1825.
   Pennsylvania, 1822.
   Merrimac, 1855.

SECTION IV.—YARDS AND DOCKS—Continued.

Pieces of Vessels—Continued.
- **United States, 1794.**
- **Delaware, 1817.**
- **Columbus, 1816.**
- **Columbia, 1825.**
- **Raritan, 1820.**

CLASS C.—PLANS.

1. **Plan of the U. S. navy-yard, Portsmouth, N. H.**
2. **Plan of the U. S. navy-yard, Boston, Mass.**
3. **Plan, sections, and elevation of the stone dry-dock now under construction at the navy-yard, Mare Island, California.**
4. **Plan of the U. S. naval torpedo station, Goat Island, Newport Harbor, Rhode Island. Scale, $\frac{1}{360}$. Surveyed by Commander E. P. Lull, U. S. Navy.**
5. **Plan of the U. S. navy-yard, Mare Island, California.**
6. **Plan of the U. S. navy-yard, New York, N. Y.**
7. **Plan of the U. S. navy-yard, Washington, D. C.**
8. **Plan of the U. S. navy-yard, Norfolk, Va.**

BUREAU OF CONSTRUCTION AND REPAIR.

Chief Constructor I. HANSCOMB, *Chief of Bureau.*

SECTION V.—CONSTRUCTION AND REPAIR—NAVAL ACADEMY.

CLASS A.—MODELS.

1. **U. S. sloop-of-war Antietam. Full model, from water-line to rail; fully rigged, with sails, equipment, and armament of twenty-two broadside guns. Length of model, 41 feet.**
2. **U. S. sloop-of-war Antietam. Full model in frame, showing in detail the construction of a ship-of-war. Length of model, 13 feet.**
3. **French line-of-battle ship Dante (built about the year 1600). Full model, fully sparred and rigged.**
4. **Model of an iron-clad ram, with grooved bottom and two submerged propellers on sides. (Modification of Commodore James Barron's ram.)**
5. **Model of the French frigate Didon. Built in the year 1797, at St. Malo; was noted for her extraordinary sailing qualities.**
6. **Sectional model of a double-bottom broadside iron-clad frigate.**
7. **Model of the U. S. ship Niagara, 1855.**
8. **Model of the U. S. ship Merrimac, 1855.**
9. **Model of the U. S. ship New Ironsides, 1862.**
10. **Model of the U. S. ship Hartford, 1858.**
11. **Model of the U. S. ship Monadnock.**
12. **Model of the U. S. ship Constellation.**
13. **Model of the U. S. ship Kearsarge (steam).**
14. **Model of the U. S. ship Vandalia, 1875.**
15. **Model of the U. S. ship Constitution (sails).**
16. **Model of the U. S. ship President (sails).**
17. **Model of the U. S. ship Ohio (sails).**
18. **Model of the U. S. ship Enterprise (sails).**
19. **Model of the U. S. ship Washington (sails).**
20. **Model of the U. S. ship Fulton (steam).**
21. **Model of a proposed sea-going monitor.**

    Dimensions: Length of water-line, 355 feet 8 inches; extreme breadth, 63 feet; depth of hold, 26 feet 3 inches; displacement at 23 feet 6 inches, 9,330 tons; exponent for displacement, .062; port-sill above water amidships, 7 feet 6 inches; proportion of length to breadth, 5.64.

    Estimated weight of hull: Bracket construction and wood planking, 3,000 tons; weight of armor, 3,000 tons; engines and coal, 1,900 tons; stores, 500 tons; total, 9,300 tons. Armament: Four 35-ton guns on pivot carriages; four 11-inch guns on swivel carriages; total, 8 guns; nominal horse-power, 1,080 H. P.; indicated horse-power, 7,500 H. P.
22. **Model of sloop-of-war of 1,200 tons.**

SECTION V.—CONSTRUCTION AND REPAIR—NAVAL ACADEMY—Continued.

23. Model of torpedo boat (twin screws).
24 Model of torpedo boat (single screw).
25. Model of the U.S. ship Vandalia (sails).
26. Gig of the Lackawanna.
27. Model of the U. S. ship Constitution.
28. Model of the U. S. ship Mississippi, 1841.
29. Model of the U. S. ship Jamestown.
30. Model of the U. S. ship St. Mary's.
31. Model of the U. S. ship Portsmouth.
32. Model of a boat with Wood's gear for lowering, hoisting, and securing boats, and apparatus for detaching and attaching them.

CLASS B.

1. Ship's knee, bent by bending machine.
2. Steam steering machine.
   "Sickles's Steam Steering Apparatus consists simply of two ordinary steam cylinders, operating a linked chain leading directly to the tiller. The valve motion is operated by a hand-wheel or cord to control the movement of the rudder. This cord or hand-wheel may be placed at any convenient part of the vessel." (Appendix No. 25.)
3. Balsa with fitments complete.

CLASS C.—RELICS.

1. *A fragment of the United States frigate Philadelphia,* Capt. Wm. Bainbridge, U. S. N., wrecked on the rocks, four or five miles to the eastward of Tripoli, Africa, November 1, 1803.
   At 7 p. m., February 16, 1854, Lieut. Stephen Decatur, jr., commanding the ketch Intrepid, of four guns, with sixty-two men and the following officers, viz:
   Lieut. STEPHEN DECATUR, JR., commander. Lieutenants: James Lawrence, Joseph Bainbridge, Jonathan Thorn. Surgeon: Lewis Heerman. Midshipmen: Ralph Izard, John Rowe, Charles Morris, jr., Alexander Laws, John Davis, Thomas Macdonough, Thomas O. Anderson. Pilot: Salvador Catoloni, entered the harbor of Tripoli, and boarded and took possession of the Philadelphia. At the time the Philadelphia was boarded, she had all her guns mounted and charged, and was lying within half gunshot of the Bashaw's castle and of its principal battery. Two Tripolitan cruisers were lying within two cables' length, with starboard quarters, and several gun-boats within half gunshot, with starboard bow; and all the batteries on shore were opened upon the assailants. About twenty men of the Philadelphia were killed; a large boat-full got off; many leaped into the water, and one man was made prisoner. After having gained possession of the frigate, Lieutenant Decatur set fire to the store-rooms, gun-room, cockpit, and berth-deck, and, with a firmness highly honorable to him, his officers, and men, they remained on board until the flames had issued from the ports of the gun-deck and the hatchways of the spar-deck; and they continued in the ketch alongside the frigate until the fire had communicated to the rigging and tops. Lieutenant Decatur did not lose a man, and had but one slightly wounded. (See The United States Naval Chronicle, by Charles W. Goldsborough, vol. i., pp. 250–256.) This fragment was recovered and brought to the United States by Capt. Earl English, U. S. N., commanding the U. S. frigate Congress.
2. Piece of timber from the starboard bow of the U. S. ship Kearsarge.
3. Piece of wood from the bow of Commodore Perry's flagship Lawrence, showing where a 24-pound shot from the enemy's gun lodged, September 10, 1813.

BUREAU OF MEDICINE AND SURGERY.

Surgeon-General JOSEPH BEALE, *Chief of Bureau.*

SECTION VI.—MEDICINE AND SURGERY.

CLASS A.—SURGICAL INSTRUMENTS.

1. General operation case of surgical instruments.
2. Expeditionary case of surgical instruments.
3. Pocket case of surgical instruments.
4. Case of instruments for operations on the eye and ear.
5. Instruments for operations on the genito-urinary organs.
6. Dental instruments, No. 1.
7. Dental instruments, No. 2.
8. Autopsy case.
9. Set of surgical splints for the treatment of fractures.
10. Additional surgical instruments belonging to the outfit for 500 men.
11. Additional general operation case.

CLASS B.—SURGICAL APPLIANCES.

1. Outfit of medicines for 500 men, comprising 147 articles.
2. Cot for transporting wounded men on board ship.
3. Stretcher for transporting wounded men.
4. Amputation table having a folding leaf, which allows it to be converted into a writing table.

CLASS C.—HOSPITAL STORES.

1. Hospital stores for 500 men.
2. Hospital furniture for a ship with 500 men.
3. Hospital bedding for a ship with 500 men.
4. Elevating bedstead with movable footboard to adapt it for use as an ordinary fracture bedstead.
5. Bedstead with woven-wire mattress.
6. Close stool.
7. Close stool.

CLASS D.—DISPENSARY FURNITURE.

1. Dispensary furniture for a ship of 500 men.

CLASS E.—MODELS.

1. Model ($\frac{1}{32}$ size) of a hospital ship.
2. Model ($\frac{1}{5}$ size) of the forward section of the U. S. ship Hartford, showing sick bay.

CLASS F.—SANITARY MACHINERY.

1. Fan for ventilating the lower parts of the ship in hot weather.
2. Aërator for distilled water.

CLASS G.—PHOTOGRAPHS OF HOSPITALS.

1. U. S. Naval Hospital at Chelsea, Mass.
2. U. S. Naval Hospital at Brooklyn, N. Y.
3. U. S. Naval Hospital at Philadelphia.
4. U. S. Naval Asylum at Philadelphia.
5. U. S. Naval Hospital at Annapolis, Md.
6. U. S. Naval Hospital at Washington, D. C.
7. U. S. Naval Hospital at Norfolk, Va.
8. U. S. Naval Hospital at Mare Island, California.
9. Natianal Home for Disabled Volunteer Soldiers and Sailors.

CLASS H.—STATIONERY.

1. Surgeon's outfit of stationery.
2. Set of record and account books for naval hospital.
3. Blank form for record of physical examinations of candidates for admission to the Naval Academy.

BUREAU OF PROVISIONS AND CLOTHING.

Pay-Director JAMES H. WATMOUGH, U. S. N., *Chief of Bureau pro tempore.*

SECTION VII.—PAY, PROVISIONS, AND CLOTHING.

CLASS A.—SPECIMENS OF THE NAVY RATION.

1. Bread.
2. Beef.
3. Pork.
4. Preserved meat.
5. Flour.
6. Rice.
7. Evaporated apples.
8. Pickles.
9. Sugar.
10. Tea.
11. Coffee, in berry.
12. Coffee, ground.
13. Butter.
14. Evaporated potato.
15. Beans.
16. Molasses.
17. Vinegar.
18. Tomatoes.
19. Pepper, in berry.
20. Pepper, ground.
21. California mustard, seed.
22. California mustard, ground.
23. Bread-bag.

CLASS B.—ORIGINAL PACKAGES AS PACKED FOR SEA.

1. Bread.
2. Beef.
3. Preserved beef.
4. Evaporated apples.
5. Pickles.
6. Sugar.
7. Coffee, ground.
8. Evaporated potato.
9. Beans.
10. Vinegar.

CLASS C.—CLOTHING.

1. Pea jacket.
2. Monkey jacket.
3. Blue cloth trousers.
4. Satinet trousers.
5. Canvas duck trousers.
6. Barnsley sheeting frock.
7. Blue flannel overshirt.
8. Blue flannel undershirt.
9. Blue flannel drawers.
10. Boots.
11. Calfskin shoes.
12. Kipskin shoes.
13. Woolen socks.
14. Cap.
15. Black silk handkerchief.
16. Working suit.
17. Blue cloth.
18. Blue flannel.
19. Blue thin flannel.
20. Barnsley sheeting.
21. Canvas duck.
22. Mattress.
23. Mattress cover.
24. Blankets.
25. Bale of satinet trousers, as packed for sea.
26. Blue satinet.

CLASS D.—SMALL STORES.

1. Tobacco.
2. Soap.
3. Beeswax.
4. Thread, white.
5. Thread, black.
6. Ribbon.
7. Tape.
8. Spool cotton.
9. Sewing silk.
10. Pocket handkerchief.
11. Needles.
12. Thimbles.
13. Jackknife.
14. Scissors.
15. Razor.
16. Razor strop.
17. Shaving box and soap.
18. Shaving brush.
19. Scrub brush.
20. Blacking brush.
21. Wisp brush.
22. Eagle buttons, large.

SECTION VII.—PAY, PROVISIONS AND CLOTHING—Continued.

23. Eagle buttons, medium
24. Eagle buttons, small.
25. Deadeye buttons.
26. Pearl buttons.
27. Fine comb.
28. Coarse comb.
29. Mess kettle.
30. Mess pan.
31. Tin pot.
32. Tin pan.
33. Spoon.
34. Fork.
35. Can opener.
36. Mustard.
37. Pepper.
38. Blacking.

CLASS E.—CONTINGENT.

1. Set of paymaster's books and blanks for a crew of 200 men for a three years' cruise.
2. Set of paymaster's stationery for a crew of 200 men for a three years' cruise.
3. Set of steward's stores.
4. Iron safe.
5. Post-office scale.
6. Copying press.
7. Door lock.
8. Padlock.
9. Candles.
10. Drawer lock.

BUREAU OF STEAM ENGINEERING.

W. W. W. WOOD, *Chief of Engineers, Chief of Bureau.*

SECTION VIII.—STEAM MACHINERY.

CLASS A.—ENGINES AND BOILERS.

1. Back-acting compound screw engine, 800 indicated horse-power. Diameter of high-pressure cylinder, 34 inches; diameter of low-pressure cylinder, 51 inches; stroke of piston, 42 inches. (For detail drawings see portfolio.)
2. Back-acting condensing engine, 500 indicated horse-power; diameter, 36 inches; stroke of piston, 48 inches.
3. Compound marine boiler, 8 feet diameter.
4. Compound marine boiler, 8 feet diameter.
5. Cutter engine and vertical boiler (6 by 6 inches).
6. Cutter engine and vertical boiler (8 by 8 inches).
7. Steam cutter propellers.
8. Copper exhaust pipe, marine engine.

CLASS B.—FILTERING APPARATUS.

1. Filtering apparatus for feed water.
2. Distilling apparatus and aerator for making fresh water.
3. Water-distilling apparatus (Baird).

CLASS C.—INDICATORS.

1. Indicator instrument for determining the condition and efficiency of the engine.
2. Salinometer for determining the density of the water in the boiler.

CLASS D.—TOOLS, LAMPS, ETC.

1. Tools.
2. Portable forge.
3. Box for transportation of forge.
4. Open-end and box wrenches.
5. Standard fire-hose, couplings, and pipe.
6. Gum packing and valves.
7. Bulkhead lamp, with reflector.
8. Globe lanterns.
9. Drip pans, oil feeders, squirt cans, hand lamps.

CLASS E.—DRAWINGS, ETC.

1. Drawing of engine and boiler.
2. Drawing of torpedo vessel Spuyten Duyvel and machinery.
3. Drawing of iron cutter and machinery.
4. Book of photographs of shops and tools used for the fabrication of steam machinery at the navy-yard, Brooklyn, New York.

SECTION VIII.—STEAM MACHINERY—Continued.

5. Steam log-book, with synopsis of quarterly log and indicator cards.
6. Drawings of compound boiler.
7. Complete set of drawings of compound engines.
8. Drawings of engine and boiler for U. S. steam cutters; diameter of cylinder, 8 inches; stroke of piston, 8 inches; grate surface, 5.33 square feet; heating surface, 150 square feet; weight, 2,800 pounds.
9. Drawings of compound screw engines, 1,150 indicated horse-power; diameter of cylinders, 42 inches and 64 inches; stroke of piston, 42 inches; diameter of screw, 15½ feet; pitch, 21 feet; grate surface in boilers, 240 square feet; heating surface in boilers, 5,986 square feet; cooling surface in condenser, 3,500 square feet.
10. Drawing of engine for U. S. steam cutters; diameter of cylinder, 8 inches; stroke of piston, 8 inches; weight, 550 pounds.
11. Drawing of engine for U. S. steam cutters; diameter of cylinder, 8 inches; stroke of piston, 10 inches; weight, 750 pounds.
12. Drawing of boiler for U. S. steam cutters; grate surface, 4.5 square feet; heating surface, 125 square feet; weight, 2,700 pounds.

SECTION IX.—PORTRAITS OF DISTINGUISHED DECEASED NAVAL OFFICERS.

1. The first commander-in-chief of the Continental Navy, Commodore ESEK HOPKINS. Commissioned by Congress in 1775 as commodore and commander-in-chief of the Navy. Died in 1802, aged eighty-four years.
2. Commodore ABRAHAM WHIPPLE. Born in Providence, R. I., in 1733. During the French and English war he commanded the privateer Gamecock, and took twenty-three French prizes in a single cruise. He fired the first authorized gun which was discharged on the water in the Revolutionary contest. He commanded the Providence from 1775 to 1779. Subsequently he commanded a squadron. In attempting to save Charleston, S. C., from capture, his squadron was lost, and his naval career was ended. Died near Marietta, Ohio, May 29, 1819, at age of eighty-five years.
3. Captain NICHOLAS BIDDLE. Born September 10, 1750. Appointed by Congress, December 22, 1775, a commanding officer in the Navy. June 6, 1776, appointed by Congress to command the frigate Randolph, 32 guns, built at Philadelphia. On March 7, 1778, while cruising, fell in with the line-of-battle-ship Yarmouth, 64 guns. An action immediately commenced by a broadside from the Randolph, and was maintained for twenty minutes, when the Randolph blew up. The gallant Biddle, with 310 men, perished in a blaze of glory. Four men only escaped, who were picked up four days afterwards by the Yarmouth, they having supported themselves on a piece of wreck, and having had nothing to eat, and no water except a little rain-water sucked from a blanket.
4. Rear-Admiral CHARLES STEWART.
   Born, July 28, 1778.
   Appointed in the Navy March 9, 1798.
   Died, November 6, 1869.
5. Rear-Admiral A. H. FOOTE.
   Born, September 12, 1806.
   Appointed in the Navy December 4, 1822.
   Died, June 26, 1863.
6. Rear-Admiral S. F. DUPONT.
   Born, September 27, 1803.
   Appointed in the Navy December 19, 1815.
   Died, June 23, 1865.

SECTION IX.—PORTRAITS OF DISTINGUISHED DECEASED NAVAL OFFICERS—Continued.

7. Admiral D. G. FARRAGUT.
Born, July 5, 1801.
Appointed in the Navy December 17, 1810.
Died, August 14, 1870.

8. Commodore JOHN PAUL JONES.
Born, July 6, 1747.
Appointed in the Navy 1775.
Died, July 18, 1792.

9. Commodore STEPHEN DECATUR.
Born, January, 1779.
Appointed in the Navy April 30, 1798.
Died, March 22, 1820.

10. Commodore JACOB JONES.
Born, 1770.
Appointed in the Navy April 10, 1799.
Died, August 3, 1850.

11. Commodore JOHN RODGERS.
Born, 1771.
Appointed in the Navy March 9, 1798.
Died, August 1, 1838.

12. Commodore O. H. PERRY.
Born, August, 1785.
Appointed in the Navy, April 7, 1799.
Died, August 23, 1820.

13. Commodore M. C. PERRY.
Born, 1795.
Appointed in the Navy, January 16, 1809.
Died, March 4, 1858.

14. Commodore EDWARD PREBLE.
Born, August 15, 1761.
Appointed in the Navy, April 9, 1798.
Died, August 25, 1807.

15. Commodore THOMAS McDONOUGH.
Born, December, 1783.
Appointed in the Navy, February 5, 1800.
Died, November 10, 1825.

16. Commodore JAMES BIDDLE.
Appointed in the Navy, February 12, 1800.
Died, October 1, 1848.

17. Commodore DAVID PORTER.
Born, February, 1780.
Appointed in the Navy, April 16, 1798.
Resigned, August 18, 1826.
Died, March 28, 1843.

18. Commodore ISAAC CHAUNCEY.
Born, February 20, 1772.
Appointed in the Navy, September 17, 1798.
Died, January 27, 1840.

19. Commodore JOHN T. NEWTON.
Appointed in the Navy, January 16, 1809.
Died, July 28, 1857.

20. Rear-Admiral GEORGE C. READ.
Appointed in the Navy, April 2, 1804.
Died, August 22, 1862.

21. Commodore JOHN B. NICHOLSON.
Appointed in the Navy, July 4, 1805.
Died, November 9, 1846.

22. Commodore LEWIS WARRINGTON.
Born, November 3, 1782.
Appointed in the Navy, January 6, 1800.
Died, October 12, 1851.

23. Commodore JOHN SHAW.
Appointed in the Navy, August 3, 1798.
Died, September 17, 1823.

24. Rear-Admiral JOHN A. WINSLOW.
Born, November 19, 1811.
Appointed in the Navy, February 1, 1827.
Died, September 29, 1873

25. Capt. PERCIVAL DRAYTON.
Born, August 25, 1812.
Appointed in the Navy, December 1, 1827.
Died, August 4, 1865.

26. Commodore RICHARD DALE.
Born, November 6, 1756.
Appointed in the Navy June 4, 1794.
Resigned, December 17, 1802.

27. Rear-Admiral WILLIAM B. SHUBRICK.
Born, October 31, 1790.
Appointed in the Navy, June 20, 1806.
Died, May 27, 1874.

28. Capt. L. KEARNEY.
Appointed in the Navy, July 24, 1807.
Died, November 29, 1868.

29. Rear-Admiral H. H. BELL.
Born, April 12, 1805.
Appointed in the Navy, August 4, 1823.
Died, January 11, 1868.

SECTION IX.—PORTRAITS OF DISTINGUISHED DECEASED NAVAL OFFICERS—Continued.

30. Purser JOHN N. HAMBLETON.
    Born, February 22, 1798.
    Appointed in the Navy: chaplain, October 26, 1819; purser, May 26, 1824.
    Died, December 5, 1870.

31. Purser SAMUEL HAMBLETON.
    Appointed in the Navy, December 6, 1806.
    Died, January 18, 1851.

32. Capt. JAMES LAWRENCE.
    Born, October 1, 1781.
    Appointed in the Navy, September 4, 1798.
    Died, June 5, 1813.

33. Commodore JOHN DOWNES.
    Born, 1786.
    Appointed in the Navy, June 1, 1802.
    Died, August 11, 1854.

34. Commodore W. C. BOLTON.
    Appointed in the Navy, June 20, 1806.
    Died, February 22, 1849.

35. Commodore M. T. WOOLSEY.
    Born, 1782.
    Appointed in the Navy, April 9, 1800.
    Died, May 18, 1838.

36. Commodore WILLIAM BAINBRIDGE.
    Born, May 7, 1774.
    Appointed in the Navy, May 20, 1800.
    Died, July 27, 1833.

37. Commodore ISAAC HULL.
    Born, March 9, 1775.
    Appointed in the Navy, March 9, 1798.
    Died, February 13, 1843.

38. Commodore ROBERT F. STOCKTON.
    Born, 1796.
    Appointed in the Navy, September 1, 1811.
    Resigned, May 28, 1850.

39. Commodore DANIEL TURNER.
    Appointed in the Navy, January 1, 1808.
    Died, February 4, 1850.

40. Commodore D. T. PATTERSON.
    Appointed in the Navy, August 20, 1800.
    Died, August 25, 1839.

41. Commodore FOXHALL A. PARKER.
    Appointed in the Navy, January 1, 1808.
    Died, November 23, 1857.

42. JACK LIBBY.
    Quartermaster U. S. Navy, 1830–'35.

43. FREDERICK BOYER.
    Quartermaster U. S. Navy, 1830–'35.

SECTION X.—NAVAL ACADEMY.

CLASS A.—PLANS, DESIGNS, ETC.

1. Plan of the buildings and grounds of the U. S. Naval Academy.
2. View of the U. S. Naval Academy grounds.
3. Designing of machinery by cadet engineers, U. S. Naval Academy.
4. Exercises in machine drawing by cadet engineers, U. S. Naval Academy.
5. Rudimentary instruction of the cadet engineers, U. S. Naval Academy.
6. Specimens of drawings from Department of Drawing, U. S. Naval Academy.
7. Photographs of the U. S. Naval Academy.

APPENDIX.

1. *Specimens of small-arms ammunition.*

The caliber 0.50 of these specimens of small-arms ammunition is the standard service cartridge of the United States Navy, manufactured at the "United States Cartridge Company's" factory at Lowell, Mass. This cartridge is of the type known as solid-head, reloading and outside primed cartridge. It is made from an alloy of copper and zinc. The mixture is intended to give the greatest tenacity with the necessary ductility for the manufacture. The metal is first rolled into sheets $\frac{80}{1000}$ of an inch in thickness; from these sheets a disk is punched which takes a cup form by being forced through a proper-shaped die; from this cup the shell is drawn to its proper length, having a surplus of metal at its closed end. The next process is to form the head, which is done by flowing the metal into the proper form, leaving it ready to receive its primer, powder-charge, and bullet.

The primer consists of two cups, one within another, with a fulminating compound between them; the inner cup has two perforations. This primer is inserted within the pocket made for it in the head of the shell, and is exploded by a blow, and the fire communicated to the powder through the perforations. The metal shell weighs 165 grains, the powder charge 70 grains, and the bullet 450 grains. The lubricator is barberry wax placed in the grooves of the bullet, and the powder is that manufactured by the Oriental Powder Company under the direction of the United States Navy Department.

The special features of this cartridge are—

1. It is impossible to burst the head by any charge of powder; and,
2. Its great safety in transportation.

2. *Chronometers at the United States Naval Observatory.*

The Naval Observatory at Washington is the depot for all chronometers belonging to the United States Navy. They are issued from this institution to all ships of the Navy that go into commission, and they are received there from vessels after the completion of a cruise. The chronometers on hand are kept together in one room in the east wing of the building, which room contains also the standard mean-time clock of the Observatory. The chronometers are arranged in wooden cases, which fill the center and the sides of the chronometer room. These cases are capable of containing two hundred and two chronometers when all filled. The temperature of the apartment is always about that of the outside air. No artificial means are employed to keep the room at an even temperature, but the variation of temperature is observed each twenty-four hours by means of a self-registering maximum and minimum thermometer.

Chronometers are purchased for the Navy, when required, by the Bureau of Navigation, the preference being given to those of American manufacture. Before the final purchase of an instrument, it is subjected to a trial of six months at the Observatory.

All chronometers on hand are wound and compared with the standard mean-time clock, daily, at noon. The error and rate of the clock are determined by observations with the transit circle at intervals of five or six days, or oftener if the weather permits.

On every tenth day the actual error of each chronometer on Greenwich mean time is computed, together with its rate during the ten days preceding, and these results, with the mean maximum, mean minimum, and average temperature during the ten days are entered in the rate-book, in which one page is assigned to each chronometer on hand. Thus, a glance at the columns of the rate-book will show the actual performance of any instrument during the time it has been at the Observatory.

The firm of Messrs. T. S. & J. D. Negus, of New York, are regularly employed by the Bureau of Navigation for the cleaning and repair of chronometers. All instruments which, in the judgment of the Superintendent, may need cleaning or repairs are sent to them, and the prices of their work are fixed by contract. No chronometer is allowed to run more than four years without cleaning; and after an instrument has been cleaned or repaired it is subjected to the same trial as those offered for purchase. If it is rejected on trial, it is sent to Messrs. Negus for readjustment. Thirty years is considered the lifetime of a chronometer. Those that are worn out in the service, or are found to be otherwise unfit for issue, are condemned by an order from the Bureau of Navigation, on a representation of the facts of the case from the Superintendent. These condemned instruments are carefully packed and stored at the Observatory. They are sometimes issued, by order of the Bureau, to shore stations or receiving-ships as local timekeepers, but never, under any circumstances, to sea-going ships.

Chronometers on hand for issue, that is, those which have passed trial subsequent to purchase or repairs, are compared with the standard clock, as above noticed, and the record of their errors and rates kept in the rate-book.

Chronometers on trial are also compared every day with the standard clock. At the end of six months the trial number of each instrument is computed by the following rule:

Find the mean daily rate and extreme daily variation for each month in the period of trial; add twice the difference between the greatest and the least of the monthly rates to the mean of the monthly variations.

If the trial number exceed eight seconds, the chronometer is rejected.

When a chronometer is received at the Observatory, it is placed under comparison from the day of its receipt, and its record in the rate-book opens on the first rate-day after its receipt.

Chronometers issued to vessels are accompanied by a paper showing their errors and rates at the time of leaving the Observatory, and the mean rate for every 10° of temperature from 40° to 80° Fahrenheit. These instruments are always sent to a distant station in charge of an officer or other competent person. If the journey is to be made by rail, the instruments are packed in a basket with cotton.

In addition to the rate-book already mentioned, a history-book is also kept, in which each chronometer occupies a page, and in which are entered its date of purchase, price, and trial number, with a description of the instrument, and its subsequent history. For convenience of reference, the history-books and rate-books are indexed in a separate volume.

There are at present on the records of the office 812 chronometers. Of these, 12 are pocket-chronometers, 9 are adjusted to sidereal time, and 103 have been condemned and stored at the Observatory. Of this number some have been also lost at sea.

There are 60 mean-time chronometers, 4 sidereal chronometers, and 3 pocket chronometers on hand at the Observatory, ready for issue. Of the remainder, some are in actual use on board ship and at naval stations; some are retained at Mare Island, California, for the supply of ships of the Pacific fleet, and some are in the hands of Messrs. Negus, under repairs.

The greatest number ever held ready for issue at the Observatory during the last five years is 125.

The least number on hand at one time during the same period is 31.

The average number on hand per month during the same period is 83.

The telegraphic apparatus for transmitting the exact instant of noon to the Western Union Telegraph office, and for dropping the time-ball on the dome of the Observatory, is in the chronometer-room, and is used in connection with the standard mean-time clock.

3. *Navy Compasses.*

Three specimens, comprising Nos. 8826, 8827, and 8828 of the makers, are exhibited. These are used as standard and steering compasses in the United States Navy, to the exclusion of all others. The bowl-circles of these compasses are fitted to a uniform gauge. The two card-magnets are compound, being built up of thin laminæ, hardened and tempered throughout their length and magnetized to their utmost. The magnet piles are set edgewise to the plane of the card. The card-circle (or graduated annulus) is adjusted into position, before fixing upon the card, to coincidence between its line of zeros and the magnetic axis of the card.

The two card-magnets weigh 1760 grains = 114 grams; and the whole weight of the card is 3720 grains = 240 grams.

The pressure on the pivot in the liquid medium is 60 grains at 60° Fahrenheit, or about 4 grams at 15½° Centigrade.

4. *Hanging or cabin compasses.*

Two specimens, including Nos. 8981 and 8982, are exhibited. The exterior of these compasses is nickelized for convenience in keeping, it having been determined that no appreciable deviation arises from either fixed or changeable magnetism in this coating. The card of this compass is adjusted to a minimum upward pressure against the pivot; that is to say, to about 60 grains at a temperature of 60° Fahrenheit.

5. *Azimuth circle.*

Two specimens, comprising Nos. 39 and 40, are exhibited. These circles are interchangeable upon every navy compass.

6. *Turret or monitor compass.*

This compass, inside of its outer case, consists of a vertical spindle, with upper and lower bearings, carrying a magnet-float above and a reading-card below, the whole being so far buoyant as to have sensibly the same specific gravity as that of the liquid medium; while an interior gimbal-action, at the magnet-float, provides for all necessary inclinations of the latter in consequence of any rolling or pitching motions of the ship.

This compass is placed in the common vertical axis of the gun-turret and pilot-house above; and it is so fixed in the roof of the latter as to bring the reading-card just below or inside, and the magnet float about 7 feet above or outside of that roof.

7. *Old compasses of the U. S. Navy.*

A dozen specimens of these compasses have been selected from those in store at the Boston and New York navy-yards, comprising such as were in use from 1820 to 1870; and they are exhibited to illustrate the grave defects of the oldest, as well as to show the progress made towards the better ones last in use.

8. *Compass-testing instrument.*

This instrument was designed by the Superintendent of Compasses as a portable substitute for the fixed compass observatory near Boston; it being sometimes desirable to have the means of examining the compasses which have been turned into store from ships going out of commission at a navy-yard, before they are otherwise handled in returning them for repairs or refitting at Boston.

9. *Magnetic collimator.*

This instrument was devised by Mr. E. S. Ritchie, of Boston. It is intended to serve as a substitute for the collimator of the ordinary form; that is, with a suspended magnet. Experience has demonstrated its sufficient sensibility, as well as its practical convenience in use. Its magnetic axis is defined by comparisons with a suspended collimator.

10. *Adjustable binnacle for correcting the deviation of the compass.*

This apparatus was designed by the Superintendent of Compasses to serve more especially as a steering binnacle for the new iron ships Alert, Huron, and Ranger,

of the U. S. Navy; but it is intended to serve equally well on board any ship whose magnetic forces, acting at a particular compass position, are of sufficient magnitude to make it expedient to effect their neutralization. The apparatus has polar, quadrantal, and vertical correctors. Each corrector is definitely adjustable to the required distance and direction with respect to the center of the compass card, and admits of being definitely registered in accordance with a prescribed form; while it also admits of being retouched, and again recorded, in the same definite manner, as found expedient from observations subsequent to those made at the port of outfit upon which the first adjustment was based.

11. *Gravitation compass, designed by the Earl of Caithness.*

This compass has the distinctive peculiarity of a heavy pendulum, which is attached to the bottom of the compass-bowl, and is claimed by its inventor to improve the stability of the bowl, this being hung in gimbals in the ordinary manner. The compass is suspended in a closed binnacle, which is provided with movable magnet-holders for the correction of the compass deviation.

12. *Deep-sea sounding machine.*

(Designed by Sir William Thomson, and modified by Captain G. E. Belknap, U. S. N.) This machine consists of the drum for the wire, with its supports, counter, and crank; the dynamometer or spring-balance wheel, with its support and dynamometer; and the endless rope with its pulley-wheel, pendant, weight-attachments, and stanchion.

The wire is reeled on the large groove of the drum, the different lengths between the splices having been previously measured; and in reeling it on the drum the number of revolutions between the splices must be noted. One bight of the endless rope is placed over the V-groove of the drum, and the part leading from the bottom of the drum is taken up over the dynamometer-wheel and once around it, and the other bigat of the rope is kept taut by being placed over the pulley-wheel, to which a pendant is attached, which is rove through a block secured to a stanchion; to the end of the pendant weights are attached which keep the pendant and endless rope taut, by means of which the revolutions of the drum may be regulated as desired. The dynamometer-wheel and dynamometer are connected by a cord or check-line which is secured to a hole in the rim of the dynamometer-wheel, and the other end is attached to the eye in the end of the spring balance.

The specimen-apparatus is attached to the wire; it consists of Belknap's cylinders with the Brooke's detaching arm. The sinkers are bored shot, and are fitted with two lugs, to which lanyards are attached, which go over the detaching arm.

The counter registers the number of revolutions of the drum, from which the depth is computed.

On reaching bottom the sinker will detach, and the upper cylinder will fall over the lower one, which has already taken up the bottom specimen.

The moment of the cylinder's touching bottom will be shown by the stopping of the revolutions of the drum and by the action of the spring-balance.

The greatest depth reached by means of this machine was 4,655 fathoms, 27,930 feet.

13. *Sir William Thomson's detaching apparatus for deep-sea soundings by piano-forte wire.*

The tube to bring up specimens of bottom has attached to it a bolt, which is held in position by a light spring. With the bolt in this position when the bottom is reached, the tube is pressed by the weight of the sinker until it penetrates so deep that the sinker rests on the bottom, or till the whole weight is borne on the tube, as is the case when the bottom is stiff clay. Independently of this action, the detaching apparatus acts when the weight is nearly all borne on the bottom; a spring double-claw opens, and leaves the sinker free, except so far as the tube and bolt influence it. Then, when hauling up commences, a slight cord attached to the bolt releases it and brings up the tube, leaving the sinker on the bottom.

Professor Fleeming Jenkin's dynamometric brake, as applied to deep-sea sounding, is shown in connection with the preceding.

Whatever weight is borne on the free end of the brake-cord, the whole tangential resistance applied to the running wheel is equal to this weight within a very small percentage of its amount.

In the two parts of the brake-cord where it leaves tangentially the running wheel, let T and T′ be the tensions so that T—T′ is the whole tangential resistance actually applied to the wheel. Let r and r' be the radii of the greater and smaller brake-drums, and let W be the weight borne on the free part of the brake-cord hanging down tangentially from the larger brake-drum. For the equilibrium of the double brake-drum we have:

$$Wr = Tr - T'r'\text{; hence,}$$
$$T - T' = W - T'\frac{r - r'}{r}.$$

14. *Belknap's specimen cylinder No.* 1.

Is designed for bringing up bottom water as well as ooze or mud.

15. *Belknap's specimen cylinder No.* 2.

Is designed for hard sandy bottom, but will also work well where soft bottom is found.

16. *Belknap's specimen cylinder No.* 3.

Is designed for use where ooze, mud, or clay may be found.

17. *Belknap's specimen cylinder No.* 4.

Is designed for use in sandy or gravelly bottom.

18. *Collins's detaching and specimen apparatus.*

The object of this apparatus is to make use of the ordinary shot as sinkers, without perforation or other preparation.

In preparing this apparatus for use, withdraw the specimen cup and attachments from the cylinder as far as possible and insert a wooden chock to prevent re-entering; place the sinker on the top of the cylinder and the crown on the top of the sinker. Then compress the spring and place the rings of the straps over two opposite lugs of the detaching ring. Then release the spring, withdraw the chock, and the apparatus is ready for letting go.

On reaching bottom, the resistance causes the specimen box to slide up, carrying the detaching ring with the cylinder, thus releasing the straps and permitting the sinker to fall off. The specimen of the bottom enters through the aperture closed by the conical valve (as in the Belknap cylinder No. 2), as well as over the top of the box in case of soft bottom.

19. *Bunting testing apparatus.* (Designed by Commander R. W. Meade, U. S. Navy.)

Directions for use.—The test pieces of bunting being properly cut, are placed in the clamps in the following manner: One-half of each clamp is placed in position by using the distance-board, the bunting is then laid so that the outer threads are the same distance from the screw holes. The upper parts of the clamps are then put on and the screws sent evenly home. The distance-board receives the large clamp at its open end, hook part of the clamp down and out.

To connect the lever with the clamps, enter the small clamp in the grooves prepared for it, and raise the long arm of the lever until the upper clamp can be hooked on to the short arm; let down the lever carefully to adjust the small clamp so that the bunting may have a direct strain.

Turn carefully the crank, and note from the forward side of the slide which carries the weight the marks at which the bunting breaks.

The figures represent pounds. Avoid hastening the speed of the weight when nearing the breaking point.

20. *Navy bunting.*

Exhibited is a piece each of red, white, and blue bunting, 18 inches in width manufactured expressly for use in the U. S. Navy, by the U. S. Bunting Company, in Lowell, Mass.

21. *Flag of Fort McHenry, Baltimore, Md., in* 1814.

This flag, seen by Francis Scott Key, of Baltimore, Md., flying from the flag-staff at Fort McHenry, in the early morning after the bombardment in 1814, inspired him to write the beautiful patriotic song "*Star-spangled Banner.*"

THE STAR-SPANGLED BANNER.

By Francis Scott Key.

Of Baltimore, Md., 1814.[*]

Oh! say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming,
Whose broad stripes and bright stars through the clouds of the fight,
O'er the ramparts we watched, were so gallantly streaming?
And the rockets' red glare, the bombs bursting in air,
Gave proof through the night that our flag was still there:
Oh! say, does that Star-spangled Banner yet wave
O'er the land of the free and the home of the brave?

On the shore dimly seen through the mists of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected, now shines on the stream.
'Tis the Star-spangled Banner! Oh! long may it wave
O'er the land of the free and the home of the brave.

And where is the foe that so sweepingly swore
That the havoc of war and the battle's confusion
A home and a country should leave us no more?
This blood has washed out his foul footstep's pollution.
No refuge could save the hireling and slave
From the terrors of flight or the gloom of the grave;
And the Star-spangled Banner in triumph doth wave
O'er the land of the free and the home of the brave.

Oh! thus be it ever when foeman shall stand
Between their loved homes and war's desolation!
Blest with victory and peace, may the Heav'n-rescued land
Praise the Power that hath made and preserved us a nation!
Then conquer we must, when our cause it is just,
And this be our motto, "In God is our trust."
And the Star-spangled Banner in triumph shall wave
O'er the land of the free and the home of the brave.

22. *Apparatus for determining personal equations in astronomical observations.*

To determine the *absolute*, as well as the *relative*, personal equation of observers with the transit instrument. This apparatus requires simply a chronograph, with a single pen to record its own indications and the work of the observer; and it may then be employed to determine the personal equation of an observer using the *eye* and *ear* method, as well as the *chronographic*.

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[*] This is the version furnished by the author in 1842.

A similar apparatus has been in use at the United States Naval Observatory since April, 1875.

23. *United States Transit of Venus Expeditions.*

For the observation of the transit of Venus in December, 1874, the "United States Transit of Venus Commission" caused eight sets of instruments to be made, in all respects identical with each other, which were used respectively at Wladivostock, Siberia; Peking, China; Nagasaki, Japan; Kerguelen Island; Hobart Town and Campbell Town, Tasmania; Queenstown, New Zealand; and Chatham Island.

The set exhibited is the one which was used at Queenstown. The instruments are mounted in three portable observatories, so constructed as to be easily taken down and erected again; and everything is arranged precisely as it was when in actual use.

The *transit house* is 2.44 meters long by 3.05 meters wide, and contains the following instruments, namely:

A *meridian instrument* arranged for the determination of time and latitude. Its telescope is of the diagonal form (that is, the eye-piece is at one end of the axis), has a focal distance of 762 millimeters, a clear aperture of 63.5 millimeters, and is provided with magnifying powers of 30, 60, and 90 diameters. The Ys are segments of cylinders, ground to fit the pivots accurately, and incapable of any adjustment. The adjustment for level is effected by means of the foot-screws of the substand, which are provided with heavy jam-nuts to fix them securely when they are properly set. To permit the use of the instrument in the vertical of the Pole-star, the azimuth adjustment has a range of more than five degrees. It is effected by means of abutting screws which move the stand upon the substand. The instrument is provided with suitable reversing apparatus, and with striding and hanging levels, the latter of which may remain upon the pivots at all times. A fine level, capable of rotating in the vertical plane, is attached to the tube of the telescope, and this, when used in connection with the zenith-distance micrometer of the eye-piece, converts the instrument into a zenith-telescope capable of determining the latitude with great accuracy.

A *chronograph* for recording electrically the times of transits of stars observed with the meridian instrument, and the exact instant at which plates are exposed in the photographic telescope. This apparatus consists of a cylinder moved by clock-work, turning once in a minute, and covered with paper upon which the record is made by a pen actuated by an electro-magnet. The cylinder is large enough to contain two hours' work, each second being represented by a space 8½ millimeters long.

A *dip circle* provided with needles 127 millimeters long, for determining both the magnetic inclination, and, by Lloyd's method, the relative magnetic intensity.

A *portable declinometer* for determining the declination and absolute intensity of the earth's magnetism.

A *universal instrument*, having horizontal and vertical circles 76 millimeters in diameter, used with the portable declinometer, and also in setting up the observatory buildings.

A *Y level*, whose bubble will indicate half a second of arc, used for determining the constants of the photographic telescope.

A *set of apparatus for the telegraphic determination of differences of longitude*, consisting of a receiving magnet, sounder, transmitting key, and the necessary switches, the whole permanently arranged upon a suitable base. It is used in connection with the chronograph, which is specially fitted for longitude work.

The *astronomical clock* and *break circuit chronometers*, used with the meridian instrument, have, for convenience, been mounted inside the Government building.

The *photographic house*, 3.66 meters long by 3.05 meters wide, stands due south of the transit house, and is fitted with the baths, chemicals, water-tank, sinks, &c., used in photography. From the northern side of this house projects the

Photographic telescope employed in taking pictures of the sun. This instrument has an objective of 12.0 meters focus and 127 millimeters clear aperture, corrected for the chemical rays. An iron pier, standing between the transit and photographic houses, carries this objective, together with the ***heliostat*** which reflects the sun's rays into it. The sensitive plate, upon which the sun's image is formed, is mounted upon a second iron pier inside the photographic house. The ***slide for exposing the plate*** is connected telegraphically to the chronograph in the transit house. A ***standard iron rod,*** suitably mounted, serves for measuring accurately the distance between the objective and the sensitive plate.

The ***equatorial house*** is 3.05 meters in diameter, octagonal in form, and surmounted by a revolving roof. In it is placed—

An ***achromatic refracting telescope*** of 1.778 meters focus and 127 millimeters clear aperture. It is mounted upon a portable equatorial stand, adjustable to any latitude whatever, from the north pole to the south pole, and provided with clock-work and divided circles. It has also a large finder, the usual battery of eye-pieces, and a double-image position micrometer.

24. *W. M. Wood's apparatus for attaching, detaching, lowering, hoisting, and securing ships' boats.*

The boat being secured for sea, and it becoming necessary in case of emergency, as a "man overboard," or other causes, to place the boat quickly in the water, and clear the ship, it is only necessary to turn back the large screw which holds the cradle under the bottom of the boat, and thus allow it to drop clear; then the pendants from the inner arms of the davits are slacked, and the boat allowed to swing out, until it hangs directly from the outer arms of the davits. (It is understood that the boat has been manned by the crew.) When in this position, the boat's descent is controlled completely by *one man,* who is stationed at the compressing lever of the friction band. He first heaves this taut, and, placing his foot on the tail of the ratchet pawl, lifts it clear, when, by slackening slightly his friction band, he can lower as rapidly as he pleases, or check it up in an instant. As soon as the boat is manned, the stroke oarsman casts off the trigger line, which is kept hitched forward as a safety lashing, and hands it to the coxswain; when the latter deems the boat low enough, he frees the ends of the connecting rope or chain from each other by a quick jerk on the trigger line. This allows the links in the ends of the boat to rise, and the ball toggles are released, and both ends of the boat are simultaneously detached. Immediately after detaching, the stroke oarsman should bring the ends of the rope together again, and set up the ship hook, which renders the boat ready for hooking on again when she returns. To hook on, it is only necessary to push the ball toggles into the links and pop in the counter-balanced tumblers, whose office is to prevent unhooking, when once hooked, by the motion of the boat. To hoist the boat, the men run away with the single rope on the large drum which winds up the wire-fall of the boat. When the boat is up, this drum is detached from its axle by withdrawing the linchpin, and the rope recoiled on it for future use and to get it off the deck. The pendants are then rove off, and the main fall slacked, which allows the boat to swing between the davits; the cradle is then lifted under it and secured. As a further securing, a line is taken over the in-board gunwale under a thwart, and back to the rail which steadies the boat in-board.

25. *Tests of iron.*

Extracts from "Organization of the United States Board appointed to test iron, steel," &c.

[This Board is appointed by the President of the United States, and instructed to determine by actual tests the strength and value of all kinds of iron, steel, and other metals which may be submitted to it, or by it procured, and to prepare tables which will exhibit the strength and value of said materials for constructive purposes.]

COMMITTEES.

(*D.*) *On Chains and Wire Ropes:* Commander L. A. Beardslee, U. S. N., chairman; Lieut. Col. Q. A. Gilmore, U. S. A.; Chief Engineer D. Smith, U. S. N.

Instructions.—To determine the character of iron best adapted for chain cables, the best form and proportions of link, and the qualities of metal used in the manufacture of iron and steel wire rope.

(*E.*) *On Corrosion of Metals:* W. S. Smith, C. E., chairman; Lieut. Col. Q. A. Gilmore, U. S. A.; Commander L. A. Beardslee, U. S. N.

Instructions.—To investigate the subject of the corrosion of metals under the conditions of actual use.

(*F.*) *On the Effects of Temperature:* R. H. Thurston, C. E., chairman; Lieut. Col. Q. A. Gilmore, U. S. A.; Commander L. A. Beardslee, U. S. N.

Instructions.—To investigate the effects of variations of temperature upon the strength and other qualities of iron, steel, and other metals.

(*H.*) *On Iron, malleable:* Commander L. A. Beardslee, U. S. N., chairman; W. S. Smith, C. E.; A. L. Holly, C. E.

Instructions.—To examine and report upon the mechanical and physical proportions of wrought iron.

(*J.*) *On Metallic Alloys:* R. H. Thurston, C. E., chairman; Commander L. A Beardslee, U. S. N.; Chief Engineer D. Smith, U. S. N.

Instructions.—To assume charge of a series of experiments on the characteristics of alloys, and an investigation of the laws of combination.

(*K.*) *On Orthogonal Simultaneous Strains:* W. S. Smith, C. E., chairman; Commander L. A. Beardslee, U. S. N.; R. H. Thurston, C. E.

Instructions.—To plan and conduct a series of experiments on simultaneous orthogonal strains, with a view to the determination of laws.

(*M.*) *On Reheating and Rerolling:* Commander L. A. Beardslee, U. S. N., chairman; Chief Engineer D. Smith, U. S. N.; W. S. Smith, C. E.

Instructions.—To observe and experiment upon the effects of reheating, rerolling, or otherwise reworking; of hammering, as compared with rolling, and of annealing the metals.

(*O.*) *On Steel for Tools:* Chief Engineer D. Smith, U. S. N., chairman; Commander L. A. Beardslee, U. S. N.,; W. S. Smith, C. E.

Instructions.—To determine the constitution and characteristics and the special adaptations of steels used for tools.

[Extracts from American Society of Civil Engineers, 4 East Twenty-third street, New York.]

TESTS OF AMERICAN IRON AND STEEL.

The committee on chains and wire rope is endeavoring to determine the character of metal best adapted to making chain and rope, and the proper form and proportions of link, and is working up the data which have long been collecting at the Navy Department. The later experiments of Commander Beardslee are extensive in range, and that officer is collating and arranging the records for the use of the Board. Further experiment will fill up any hiatus that may be detected. The navy-yard at Washington, where this work is going on, affords peculiar facilities not only for testing but for making chain-cable of any desired size, form of link, or quality of metal.

Work already done there by the chairman of this committee has revealed serious defects in accepted tables of sizes and strength, and has indicated the rate of variation of strength with variation of size of bar, and permitted the formation of a new and trustworthy table.

The committee on malleable iron has collated a large mass of valuable information and the records of a great number of experiments, and, among other important matter, has obtained an extensive collection of experimental determinations of the effect of time upon the elevation of the elastic limit by strain, during periods varying from a few seconds up to a year. The variation of quality due to differences of size and form of section of the bar, and the modification of strength, ductility, and resilience, are under investigation. The chairman of this committee is also determining the influence of proportions of test-pieces upon their ultimate resistances.

The committee on reheating and rerolling is to test iron, &c., in the several stages of manufacture, refined and unrefined, and to observe the effects of successive reheats, of reworking and rolling, to determine, if possible, what amount of working is demanded by different irons, and what are the temperatures which will practically give the best results.

The committee on steel for tools is making an extended series of experiments at the Washington navy-yard to determine the value of various steels for tools. A large collection of steels is made; their composition is determined, and they are then carefully tested by setting them at work—turning, planing, boring, and chiseling—and their behavior and their composition being thus ascertained, it will probably be easy to learn the chemical and physical characteristics of the best tool. The names of makers are of no importance in this investigation, and are not to be reported. The Board, in all its work, will avoid reference to makers of material in any way that may injure any manufacturer directly or indirectly. Scientific knowledge of directly practical value, and engineering facts and figures, solely are sought.

PROPORTIONS OF TEST-PIECES. PEMBROKE RIVET 2 INCH.

Diameter.			Reduction of area.		Length.			Per cent. elongation.		First strain per square inch.	Ultimate strain per square inch.			Per cent. strain to break.
Original.	Ten. lim.	Fractured.	Ten. lim.	Fractured.	Original.	Ten. lim.	Fractured.	Ten. lim.	Fractured.		Original.	Ten lim.	Fractured area.	
					Inch.									
1.000		.693	......	52	8.00	9.63	10.25	20.3	28	28,619	45,800	......	95,373	62.5
.999	.853	.675	27	54.3	7.00	8.82	9.09	26	29.8	30,000	45,930	62,992	100,614	62.1
1.000	.880	.704	22.5	50.3	5.82	7.18	7.57	23.2	29.9	26,700	45,905	59,396	92,818	58.2
.999	.881	.700	22.2	50.9	4.90	6.04	6.42	23.3	31	28,060	45,768	58,850	93,230	59.4
.998	.881	.683	......	53.1	3.95	5.02	5.33	27.3	35	26,588	46,561	......	99,413	57.1
1.000	.853	.705	22.3	50.3	2.98	3.70	4.05	24.3	36.1	....	46,759	60,244	94,070	......
1.001	.863	.700	25.6	51	1.98	2.41	2.78	21.9	40.4	28,000	46,734	62,874	95,569	60
1.000	.849	.718	28	48.4	.975	1.25	1.42	22	45.2	28,200	47,033	66,843	93,455	58.4
.985	......	.897	......	17	G.	......	...	......	....	48,000	61,023	......	73,587	78.7

MEMORANDUM OF TESTS OF FOUR SAMPLES MADE FROM 2-INCH CATASAUQUA BAR.

	Marks on samples.			
	Catalogue 2 in No. 10.	Catalogue 2 in No. 11.	Catalogue 2 in No. 12.	Catalogue 2 in No. 13.
Original diameter	1.238	1.245	.5	.498
Fractured diameter	.781	.787	.327	.328
Original length	7.395	7.40	2.992	2.989
Fractured length	9.860	9.887	3.810	4.025
Commenced to stretch	37,425	38,300	5,000	5,650
Diameter at first stretch	1.231	1.237	.498	.493
Length at first stretch	7.412	7.434	3.000	3.002
Lever balanced	59,600	60,125	9,800	9,700
Diameter at lever balance	1.088	1.160	.438	.439
Length at lever balance	9.277	9.068	3.545	3.723
Lever fell	59,600	60,125	9,800	9,700
Diameter at lever fall	1.063	1.068	.425	.421
Length at lever fall	9.370	9.374	3.608	3.840
Time balancing ... minutes	10	9½	2	2½
Broke at	59,600	60,125	9,800	9,700
Broke to square inch	49,542	49,404	49,928	49,820

The fractured ends of the samples show small squares, as if the iron had been made of square bars welded together.

Iron which, when manufactured, is, during its use, to be subjected to sudden transverse strains should possess in the greatest degree the quality of resilience or power of resisting shocks.

A great tensile strength is seldom accompanied by a proportionate transverse strength or resilience. The strain to which a chain-cable is most liable to yield is that of a surge or sudden strain; iron suitable for chain-cables should have the power of resisting these strains.

The testing machines in general use test only the power of the metal to resist steady strains of tension and torsion.

This machine has been contrived to ascertain the power of iron rods to resist shocks.

The following is a description, accompanied by Figs. 1, 2, and 3:

DESCRIPTION.

A cast-iron hammer having a wedge-shaped impact surface upon its lower side (Fig. 2) is made to traverse two perpendicular iron rods of, say, 2½ inches diameter, and from 30 to 50 feet in length, which pass through holes in the body of the hammer, as shown at *a* (Fig. 1). The hammer may be of any weight, a convenient one being 100 pounds.

A traveler of wood or metal, fitted with a pair of hooks which can be opened or closed by pulling up a cord (*h*) attached to them, is placed upon the rods above the hammer, as shown at *e* (Fig. 1). At the foot of the rods, they passing through it, as shown at *i*, a heavy cast-iron block with a cylindrical opening (*k*) 8 inches in diameter is fitted; the specimen of iron to be tested (*j*) is placed across this circular hole, the hammer resting upon the box which surrounds the anvil, to prevent accidents, as shown by dotted lines (*o*), and supported by a chock (*p*).

A common purchase (shown at *f*), through which a hoisting rope is led to the windlass (*g*), is secured to the upper portion of the framework.

At the side of one of the rods an upright, marked plainly to feet and inches (*l*), is secured.

Should it be necessary to carry the rods through a flooring, as shown at *x* (Fig. 1), a slight projection on the upper surface of the traveler (shown at *m*) is fitted to come in contact with and operate a light rod which has on its lower end a pointer (*n*).

To use the machine, the traveler is lowered until the clip-hooks clasp a projection on top of the hammer; the latter is then hoisted to the desired height, the lower edge of the hammer being brought in line with the figure on the measuring rod.

Should the hammer be hoisted out of sight, through a floor, the marker (*n*) will indicate its height.

When at the proper height, the tripping-line (*h*) is pulled, opening the hooks, and releasing the hammer, which falls, striking the specimen (*j*) in the center a blow whose force can be measured, and which is dependent upon the gravity of the location, and slightly decreased by the friction.

A coarse and brittle iron will break short at a moderate blow from this hammer; a tough and strong iron will resist its utmost power.

The weight of the hammer can be increased at will, by the addition of lead weights.

An iron which exhibits good results when tested in this manner, and also possesses great power of resisting steady strains of tension, is suitable for chain cables; one that does not, is utterly unsuitable for the purpose.

To estimate the force of blow delivered by the impact-hammer machine, use the following formula:

$$F=\frac{wv^2}{2g}\text{, in which}$$

w = weight of hammer in pounds,
v = its velocity in feet,
g = gravity (at Washington 32.153),
F = force in foot-pounds.

The formula is derived from the empirical law, as follows:

$$h=\tfrac{1}{2}gt^2,$$

Multiply both by g, and you have

$$gh=\tfrac{1}{2}g^2t^2\text{, or}$$
$$2gh=g^2t^2\text{, or}$$
$$\sqrt{2gh}=gt\text{, which is practically found to equal } v\text{: hence,}$$
$$\sqrt{2gh}=v\text{, or } h=\frac{v^2}{2g}$$

is the effect of one pound falling one foot in one second.

The force F of any number of pounds w, falling one foot in one second, is w times as great, or

$$Fh=\frac{wv^2}{2g}\text{, or, as } h=1,$$

$$F=\frac{wv^2}{2g}\text{, as given above.}$$

To obtain the numerical value of v, let

h = height in feet to which the weight is raised;
g = (at Washington) 32.152;
t = time.

From the formula $h=\tfrac{1}{2}gt^2$ deduce, as before, $\sqrt{2gh}=gt=v$, or for a height of 30 feet, since $2gh=v^2$, you have

$$2\times 32.153\times 30=v^2,$$

or

$$v=\sqrt{1929.1800}=43{,}92,$$

or velocity of hammer at instant of striking when dropped 30 feet (the friction not being estimated). The force is derived from the formula

$$F=\frac{wv^2}{2g},$$

and developed is

$$\frac{43.92^2\times 100}{32.153\times 2}=$$
$$\frac{1929.18\times 100}{32.153\times 2}=$$
$$\frac{1929.18}{64.3}=3{,}000\text{ pounds.}$$

To make a table giving foot-pounds force for each foot of hoist:

$$\frac{\cancel{2}\times\cancel{32.153}\times a\times 100}{\cancel{2}\times\cancel{32.153}},$$

in which a varies for each foot; cancel common factors, and the foot-pound force is at each height = the height multiplied by 100; thus, 30 feet drop = 3,000 pounds.

26. *Steam Steering Machine (Sickles's patent).*

[Extract from a report of U. S. naval officers on the trial of this machine.]

This apparatus was temporarily applied to the U. S. iron-clad Roanoke, for the reason that this vessel not only required greater power to move her large rudder, but also presented the difficulty of being efficiently steered from the pilot-house above her turret.

The steering machine consists of two cylinders of 24 inches diameter and 12 inches stroke, placed at right angles and *connected directly* to the steering drum. It was placed in the lower chamber of the center turret, occupying a space of 8 feet 11 inches by 5 feet 6 inches, with a height over all of 5 feet 11 inches, and, although of same general principle as has been heretofore applied, yet the details of this arrangement have been so perfected as to gain all requisites of rapid steering from any part of the vessel without interfering with the ordinary internal arrangements of a vessel-of-war. The machine itself is to be placed below the water and entirely protected from shot, the only parts exposed being the ordinary tiller ropes and the small line leading to the deck or pilot-house. For use in iron-clads, where space is of so much importance, the dimensions above given can be materially reduced.

With the ordinary hand-steering wheel, it took the full force of two men (all that the pilot-house could conveniently contain) over to minutes two move the rudder from its extreme positions of starboard and port, and requiring twenty-six turns of the wheel. With the steam machine, one man could easily move the rudder the same distance in three seconds with three and one-half revolutions of the wheel. The steering cords were led to the pilot-house above the forward turret, and leaders provided by which the vessel could be steered from any part of the vessel deemed most convenient.

The steam-steering arrangements were applied to the tiller, entirely independent of the hand-steering gear, so that either one was available for use without interfering with the other. An indicator is fitted with the machine, so that the helmsman can at any time ascertain the position of the rudder, and the engine is so designed as not to require either skilled mechanical labor in its operation or care, as it can be worked by any seaman in the same manner and more readily than the ordinary steering wheel.

It is at all times ready for use when steam is raised, as by the peculiar arrangements of valves it is not necessary to first free the machine from condensed water, or prepare it for service, as is necessary in the Cameron steam-engine.

In the steam-pipes is fitted a regulating valve, so as to retain the power of the engine with the same and varying pressure of steam; that used on this trial averaging about 17 pounds per square inch.

The valves of the engine are so designed as to hold the rudder at any desired angle, and also where "hard over," to slightly yield for the instant to any sudden shocks or strains that may endanger the safety of the rudder.

The durability of the various details of the steering-gear was clearly shown, as the apparatus was kept in use for four consecutive days, and subjected to the severest trial to test its strength. It is certain in its action, and so little labor is required from the man at the wheel that he can be more careful in his attention to the course of the vessel, and act with greater promptness in every emergency, and more securely guard against accident from collision.

In case of a vessel-of-war in action, this most important point cannot be overrated, as quickness of maneuver in making the attack, as well as facility in avoiding the enemy, either from the ram or torpedo, is one of the most essential features of a man-of-war.

27. *Life Boat, or "Balsa," designed by Commodore Daniel Ammen, U. S. Navy.*

The original of this life boat, or balsa, was designed and built on board the U. S. steamer Mohican, in 1865, by the commanding officer of that vessel, now Commodore Daniel Ammen, U. S. Navy.

It is not patented, and is built at the U. S. Navy-yards for use on board of vessels-of-war. It has great buoyancy in proportion to its weight, is constructed at small cost, easily kept in repair, and cannot swamp. If injured by running upon rocks, a patch of tarred cotton cloth placed under a thin sheet of lead, and tacked over the hole, makes the boat practically as serviceable as ever. It sails well, is pulled with ease, and can be handled with great facility.

Modified for river use and in bays, it would offer an inexpensive means of floating and carrying a large number of persons, should the vessel supplied with them be lost by fire or otherwise; and in emigrant ships they could be used as water-casks, and speedily emptied if required for use as life boats.

EXHIBITS OF ARTICLES GENERALLY USED IN SIAM,

AND OF

SAMPLES OF TRADE OF SIAMESE ORIGIN,

PREPARED BY ORDER OF HIS MAJESTY THE KING OF SIAM,

AND PRESENTED BY HIS MAJESTY TO THE UNITED STATES OF AMERICA AS A SOUVENIR FROM THE KINGDOM OF SIAM.

CORRESPONDENCE.

NAVY DEPARTMENT, *Washington, September* 30, 1876.

SIR: The Department incloses for your information a copy of a dispatch from Rear-Admiral William Reynolds, commanding Asiatic Station, dated June 26, 1876, also a copy of its inclosure from the minister of foreign affairs of Siam, in relation to a collection of articles from that Government to the Centennial Exhibition at Philadelphia.

Also inclosed is an inventory of the articles, which you will please endeavor to have translated; after which you will return it to this Department to be returned to the Department of State.

The articles referred to have arrived at San Francisco, and are on the way to Philadelphia.

Very respectfully,

I. C. HOWELL,
Acting Secretary of the Navy.

Rear-Admiral THORNTON A. JENKINS,
U. S. Navy, Philadelphia, Pa.

No. 59.]

FLAG-SHIP TENNESSEE, SECOND RATE,
Kobe, June 26, 1876.

SIR: I inclose herewith a copy of a letter addressed to me by the minister of foreign affairs of Siam, and also of a letter from the same personage to the Secretary of State of the United States, inclosed therein, and received by the last mail from Hong-Kong.

The list of articles did not accompany the letter.

Commander Matthews reports from Hong-Kong, June 14, that the Siamese Curios could not go in the Alaska, then about to leave that port, as she was full of freight, but would go by next steamer, the Belgic, to leave July 1, for San Francisco. They should arrive in Philadelphia during the first of August.

I am, very respectfully,

WILLIAM REYNOLDS,
Rear Admiral Commanding U. S. Naval Force, Asiatic Station.

Hon. GEORGE M. ROBESON,
Secretary of the Navy, Washington.

CHOW PHYA BHANUWONGSE MAHA KOSA DHIPOTI THE PHRAKLANG, *Minister for Foreign Affairs*, has the honor to address

His Excellency the Rear-Admiral REYNOLDS.

SIR: His Majesty the King of Siam is much gratified by your excellency's having permitted Commander Matthews to return in the U. S. steamer Ashuelot, to take charge of the collection which His Majesty had had much pleasure in preparing for the Exhibition at Philadelphia.

Commander Matthews arrived here on May 26, and I have committed to his care for embarkation the collection described in the accompanying catalogue. I beg your excellency to transmit the collection to the Government of the United States.

I inclose copy of my dispatch to the Government of the United States for your excellency's information.

I beg your excellency to accept the assurance of my high esteem.

Dated at the foreign office at Bangkok the 30th of May, 1876.

(Signature.)

(Seal of Minister for Foreign Affairs.)

CHOW PHYA BHANUWONGSE MAHA KOSA DHIPOTI THE PHRAKLANG, *Minister for Foreign Affairs*, has the honor to address

Hon. HAMILTON FISH,
Secretary of State, United States, Washington.

SIR: His Majesty the King of Siam has commanded me to address you as follows: On the 23d of April last Commander Matthews, in the United States war steamer Ashuelot, came to Siam on a visit to the United States Consul, and had audience of His Majesty the King of Siam, after which His Majesty took counsel with the Senabodi on the subject of the collection prepared by the Government of Siam for the Exhibition at Philadelphia, which, to the regret of the Siamese Government, still remained on hand, not having been forwarded at the appointed time owing to causes which have been explained in my dispatch of the 28th of January, 1876. His Majesty the King of Siam commanded me to ask Commander Matthews to take charge of the collection and convey it in the Ashuelot to the Rear-Admiral Reynolds, on the Japan Station, to be forwarded to the Government of the United States. Commander Matthews left Siam and communicated with the Rear-Admiral Reynolds, and on the 26th instant returned to Siam in the United States steamer Ashuelot, and informed me that Rear-Admiral Reynolds had intrusted him to fetch the collection intended for the Exhibition.

His Majesty the King and the Senabodi of Siam have been most pleased to intrust to Commander Matthews the collection, which His Majesty the King and Senabodi have prepared for presentation, with their best wishes, to the Government of the United States. When the Exhibition is ended, please exhibit it at the Museum as a souvenir from the Kingdom of Siam. It is not a collection of articles of peculiar excellence, but of articles generally used in this country, and of samples of articles of trade of Siamese origin; a collection which the Siamese Government had much pleasure in preparing as a contribution to the Exhibition as a token of their esteem and respect for the Government of the United States.

* * * * * * *

His Majesty the King of Siam and Senabodi pray that the Power which is highest in the universe may assist, foster, and protect the city of Washington and the United States of America, and may from the date of their centenary onward bless them with a prosperity still greater than that they have hitherto enjoyed.

I beg to add the assurance of my high esteem.

Dated at the foreign office at Bangkok the 30th of May, 1876.

(Signature.)

(Seal of minister for foreign affairs.)

EXHIBIT OF THE KINGDOM OF SIAM BY THE UNITED STATES NAVY DEPARTMENT.

NOTES.

The apostrophe (') after consonants indicates that that consonant is aspirated.

The apostrophe (') after the vowel *u'* indicates the French *u*.

This mark (ʹ) over a vowel indicates the tone made in the roof of the mouth, designated the high tone.

This mark (¨) over a vowel indicates the prolonged tone.

This mark (ˆ) over a vowel indicates an abrupt tone, throwing the sound from the speaker.

This mark (ˋ) over a vowel indicates an abrupt tone thrown into the chest.

All vowels without these tonal marks are spoken naturally without effort.

This mark (:) after a vowel indicates a short vowel.

Twelve Siamese *niew* equal 10 English inches.

Siamese *wah* equals 80 English inches.

Siamese *sauk* equals 20 English inches.

Siamese *K'up* equals 10 English inches.

One *picul* equals 133⅓ English pounds.

One *ch'ang* equals 1⅓ English pounds.

IMPLEMENTS FOR MAKING CLOTH.

National Museum No.	Siamese names.	English names.
27101	Kee-ru'an	Loom, one of the implements used by a person sitting and weaving cloth.
27102	P'im	An implement in which silk to be woven is put.
27103	Kra:-som	An implement on which the woven cloth is rolled.
27104	Ta:-kron	Shuttle, an implement in which is put the spool of silk used in weaving cloth.
27105	Eight Mài-Luk Ta-kans	For gathering the Ta-kans and placing them with the standing Huk.
27106	Mài-ya-ow	Two sticks over forty inches long, to be tied to the Ta-kan that are trodden with the feet.
27107	Kra: dahn	Board to roll the silk of the standing Huk.
27108	Two Tong Taangs	To which are attached the boards on which the standing Huk is rolled
27109	Mài ya-ow	Stick over sixty inches long, for stretching the Tong-taang, placed upon the frame Kee.
27110	Mài-ya-ow	Stick over sixty inches long, for stretching the P'im and the Ta:-kan on the frame Kee.
27111	Mài-ya-ow	Stick over forty inches, to be fastened beneath the frame.
27112	Chu'-ak	Rope for fastening the Tong-taang sticks underneath to make all taut on the frame.
27113	Ra:-wing	Implement in which are put the cocoons.
27114	Ak	Implement for unraveling silk from the cocoons.
27115	Nai -k'rohng	Spinning-wheel for making silk or cotton yarns.
27116	K'ong-p'at	For reeling off the spun silk.
27117	Heep	For compressing the loose cotton.
27118	Kong-deet	Implement for snapping the cotton.
27119	Ka:-su-ee	Implement to receive the spool for the shuttle.
27120	Kong-p'át	Implement for snapping off the cotton from the Nai.
27121	Heep-màhk-muk	Pearl beetle box.
27122	Pahn-waanfá, muk	Stand of glass and pearl for cloths.
27123	Heep-sùi-kamp'ee	Bookcase.
27124	Ta-lùm	Set of stands (3), inlaid with pearl, on which food is placed.
27125	Châun-hòi-muk	Pearl spoon.
27126	Yok-mái-nàh-kep	Silk cloth.
27127	Mu-ang hahng karank nàh kep	Cloth.
27128	P'um k'amáue	Cambodian silk cloth.
27129	Yok t'aung	Cloth, gold flowers.
27130	P'umk'amáne nàh kep	Cambodian cloth.
27131	Mu-ang Cheen	Chinese cloth.
27132	P'àh p'u'n	Cloth.
27133	P'àh tah sa-muk	Cloth raised.
27134	P'àh tah let gnah	Cloth, raised like teel seed.
27135	P'àh söng	Two cloths.
27136	T'ee naun p'ap	Folding bed.
27137	Máun srée sa nún sah ra: bap	Colored pillow, for resting body and arms.
27138	Máun kâhng	Pillow for the sides.
27139	Máun nùn t'âu	Pillow for resting the legs
27140	Máun ing sara bap	Pillow to lean the back against
27141	Máun lĕm nàh pak	Angular pillow.
27142	Mûng p'raa tit luk mâi	Silk curtains, flowered.

IMPLEMENTS FOR MAKING CLOTH—Continued.

National Museum Nos.	Siamese names.	English names.
27143	K'an nám p'ahn raung	Water bowl stand.
27144	K'an nám lâhng nàh	Wash bowl.
27145	K'an nâm, p'ahn raung mee fáh	Water bowl stand with cover.
27146	K'an nàm lâhng nàh mee fáh	Wash bowl and cover.
27147	Bau: p'ap raung nàng	Folding cushion seat.
27148	T'äht láhng nàh tom ta: t'aung	Wash bowl tray, gilt.
27149	Pahn k'rü-ang paang tom ta: t'aung	Lady's toilet stand with seven gold pots (designated Tóh prik).
27150	K'an tom ta: t'aung	Bowl with cover and stand.
27151	Rah-ow	Gilt stand for holding the towel.
27152	Toh: tom ta: t'aung raung w'ée	Comb stand.
27153	Pahn mähk tom ta: t'aung	Beetle-nut stand (with accompaniments, three boxes, one cup, one bag).
27154	Toh: tom ta: t'aung raung lü-em.	Stand for satchel.
27155	Kah nám yen tom ta: t'aung mee t'aht raung.	Gilt water goblet and tray.
27156	Täht mähk tom ta: t'aung	Beetle tray (with accompaniments, three boxes, one cup, one bag).
27157	Ka: t'óhn tom ta: t'aung pähk kraa yäi.	Large spittoon, gilt.
27158	Ka: t'óhn tom ta: t'aung lek	Small spittoon, gilt.

HATS AND CAPS.

27159	Mü ak hùm p'äh	Hats and caps covered with cloth.
27160	Mü-ak la: met	Hat with air holes for ventilation, covered with cloth.
27161	Mü-ak cap	Cap covered with cloth.
27162	Mü-ak la: met	Cap covered with cloth.
27163	Mü-ak muking cap	Cap.
27164	Mü-ak mài dài hùm p'äh	Hats and caps without cloth covers.
27165	Mü-ak la: met	Ventilator hat.
27166	Mü-ak cap	Cap.
27167	Mü-ak la: met	Hat.
27168	Mü-ak muking cap	Cap-
27169	Tang nám ràun	Hot water bucket.
27170	Aap mähk	Beetle basket.

CAGES.

27171	Krong nok k'óu yäi	Cage for a large turtle dove.
27172	Krong nok k'óu chä: wah	Chä: wah dove cage.
27173	Krong nok ka: t'ah	Partridge cage.
27174	Krong nok k'üm	K'üm cage.

BASKETS.

27175	Ka: bung La: k'aun	Ligore basket.
27176	Ta: kraang dauk pekun	Wicker-work basket. The apertures resembling the flower Pekun.
27177	Ka: ch'óu dauk mâi	Flower basket.
27178	Ka: t'ai	Small basket, bamboo.
27179	Ka: lòh	Small bamboo basket.
27180	Ka: ch'äht	Shallow basket.
27181	Ta: kraang ràun yah	Basket-work sieve for medicines.
27182	Fêm	Bamboo basket with cover, in which soldiers, when going to war, carry rice.
27183	Sa: mok	Small square and otherwise shaped bamboo baskets.
27184	Ka: kraang ràun	Bamboo sieve.
27185	Ka: dòng fat	Bamboo sieve, with stiff bamboo edges.
27186	Ka: bung	Basket.
27187	Ka: kràh lek fai	Porous basket for steel and flint.
27188	K'raang tak nâm	Basket water dipper, dammared.
27189	Ta: krau soi	Basket for gathering fruit from trees.
27190	Ta: krau	Rattan foot-ball.
27191	P'äum	Bamboo basket-work, grainery.
27192	Ka: bai	Dipper-shaped basket.
27193	Ka: ch'aun	Cocoanut milk strainer.
27194	Kr'u	Bamboo water dipper.
27195	Ta: kràh ch'amra:	Basket for washing and cleansing articles.
27196	T'ang sam-rap säi nám ràun	Bucket for warm water.
27197	Kläung sam rap säi mähk	Beetle box.
27198	P'äum sám rap sai k'ow plu'-ak	Basket-work for paddy stores.
27199	K'ru sam rap tak nâm k'u	Basket water dippers.
27200	K'raang sam rap säht tòn mâi	Long-handled bamboo basket dipper for watering plants.
27201	Kra: kràu sam rap sói luk mâi	Fruit-gathering implement.

HORSE GEAR.

National Museum Nos.	Siamese names.	English names.
27202	P'áang kàng	Side leather.
27203	Bang hien	Bit and bridle.
27204	Ahn	Saddle.
27205	Boh: raung ahn	Cushion used under the saddle.
27206	P'àh ra: bai nàh chau	White screen borders.
27207	P'àh chau nang	White screen.

PERFORATED LEATHER (USED FOR NIGHT PLAYS) FIGURES.

27208	Du-ang p'ra ahtit	Figure of the sun made of perforated leather.
27209	Du-ang p'ra chant	Figure of the moon made of perforated leather.
27210	Nahng Maakaláh	Perforated leather representation of Lady Maakaláh.
27211	Rahma Sún	Perforated leather representation of Rahma Sún.
27212	P'aang sam rap pit tai nah chau	Bamboo woven partitions placed under the screen.
27213	Bai pit lang chau	Partition used back of the screen.
27214	T'ong lek pak yaut chau	Four small flags to be fixed on the top of the screen.
27215	T'ong lek p'ak lang chau	Four small flags to be placed behind the screen.
27216	Nang Yak	Five perforated leather representations of the monster Yak.
27217	Nang P'ra rahm	Three perforated leather representations of P'ra rahm.
27218	Nang k'áne ling	Three perforated leather representations of monkey fights.
27219	Nang nahng	Four perforated leather representations of females.
27220	Nang ta: lök	Perforated leather representation of a buffoon.

TOOLS AND IMPLEMENTS.

27221	T'ang	Anvil.
27222	Káun kep	Hammer (for contracting metals).
27223	Káun p'äa	Hammer (for expanding metals).
27224	Kâun kün rup	Hammer (for shaping metals).
27225	Kop t'awai	Burman plane.
27226	K'eem	Pincers.
	K'eep	Nippers.
27228	Süp	Bellows.
27229	P'ráh krai	Long, narrow knife.
27230	P'râh Siem	Knife, broad at the end.
27231	P'ráh hu-et	Grass and underbrush cutter.
27232	P'ráh hien	Knife for leveling off.
27233	Meet sai	Malay knife.
27234	K'áu ch'ak mähk	Curved knife for cutting down beetle nuts.
27235	Lü'-ay ok tat kra: dahn	Saw with bamboo supports to cut planks with.
27236	Lü'-ay sung	Saw for sawing logs.
27237	Kop Cheen	Chinese plane.
27238	Sieu	Chisel.
27239	Chäup	Implement for breaking up the ground.
27240	Siém	Implement for digging small holes into the ground.
27241	Háa	Fish net thrown by men.
27242	U-en	Stationary fish net.
27243	Sa: wing	Net.
27244	Cháun	Net.
27245	Yau	Net.
27246	Laup	A bamboo snare to catch fish.
27247	Sai	A bamboo basket with fish trap.
27248	E-chü	Fish trap. The fish enter but cannot return.
27249	Lan	Fish trap.
27250	Sum	Fish trap.
27251	Bet ra-ou	Fish line for many hooks.
27252	Bet t'aut	Fish line with hook and handle.
27253	Bet-K'an	Fish trap, springs and hooks the fish.
27254	Cha-mü-ek	Trident harpoon.
27255	Sàum	Spear for eels.
27256	Fu'-ak	Fish trap of bamboo slats.
27257	Klaung-Ch'a:na:	Drum.
27258	Sä-lieng	Sedan top or cover.
27259	Plaa-kun-náhng	Nobleman's sedan.
27260	Sappra: k'ap	Elephant's saddle.
27261	K'áu-châng	Hook for managing elephants—controlling them.
27262	Kra-Ching	
27263	P'ahn-nàh	A pointed piece embossed with ivory.
27264	Sappra:-K'one	
27265	P'ahn-t'âl	A hind piece embossed with ivory.

SIAMESE PRIEST'S ARTICLES.

National seum N	Siamese names.	English names.
27266	Baht	Priest's rice pot, used to receive his morning meal.
27267	Tah-la:-pat	A priest's fan.
27268	Mài t'àu	Walking stick.
27269	Páh-krai	The three cloths constituting a priest's dress.
27270	Yahm	Priest's satchel.
27271	Ka: t'one-t'om p'at	Priest's spittoon.
27272	K'an-nam-pahu-raung-t'om-pat	Wash bowl and receiver.
27273	Kah-nàm-tom-pat	Water goblet.
27274	Klaung-màhk-tom-pat	Beetle box.
27275	Klàung-kém	Needle case.
27276	Hin-meet-kohne	Hone for sharpening razors.
27277	Màu-mut	Urinal.
27278	Màu-ch'amra:	Chamber vessel.
27279	T'ee-naun	Bed.
27280	Máun-k'wáhn	Axe-shaped pillow.
27281	Máun-ing	Rectangular pillow.
27282	Tom-pak-ch'oeng-pum	Priest's cloth.
27283	Tom-pak-laung-chu-en	Priest's cloth.
27284	Choeng-pum-tom-pak-riu	Cloth, ribbed.
27285	Rahta:-k'ot náhm-ka: nún-see-muang.	A clored sash.
27286	P'àh-hom-naun-praa-saung-ch'àn	A silk sleeping quilt or sheet, double.
27287	P'àh-hom-naun, lai sáung-ch'an	A colored sleeping cloth, double.
27288	Tama:-ka:-rok-sam-rap-kraung-nàm.	A water filter or strainer.
27289	P'àh-sàng-wein-daang	Cloth.
27290	Pàh-sakaraht-hom-naun-p'ap	A woolen blanket.
27291	P'àh-laht-p'ap	Rug.

MUSICAL INSTRUMENTS.

27292	Kraa-färang	European trumpet.
27293	Kraa-gnaun	Trumpet, buffalo horn shape.

CLOTHS.

27294	P'àh-sin	Cloth.
27295	P'àh-tah-tóhng	Cloth.

UMBRELLAS.

27296	P'ra krot-mote	Large umbrella.
27297	P'ra-krot-p'àh-k'ëe-pung	Waxed cloth umbrella.
27298	Rom-kun-nahng	Nobleman's umbrella.
27299	Chat-h'a-ch'an	Five-sectioned umbrella.
27300	Chat chet-ch'an	Seven-sectioned umbrella,

TOBACCO.

27301	Yah-hüi-nah	Tobacco.
27302	Yah-löm	Tobacco.
27303	Yah-hüu-sai	Tobacco.
27304	Yah-nàm sak	Tobacco.
27305	Yah-hüi-toh	Tobacco.
27306	Yah-pah-daang	Tobacco.

MUSICAL INSTRUMENTS.

National Museum Nos.	Siamese names.	English names.
27307	T'oue	Musical instrument.
27308	Ram ma nah	Musical instrument.
27309	Cha: k'aa	Musical instrument.
27310	K'a: chap pee	Guitar.
27311	Sée sau	Fiddle.
27312	Pee	Flute.
27313	Pee chawah	Chawah flute.
27314	Sau Oo	Fiddle.
27315	Klaung käak	Malay drum.
27316	K'äung wong	Circular brass gongs.
27317	Ta: P'ohn	A kind of drum.
27318	Klaung	A kind of drum.
27319	Poeng mahng	Musical instrument.
27320	Ra: naht t'ùm	Musical instrument.
27321	Ra: naht ake	Musical instrument.

BOATS.

27322	Ru'a prattu	Boat.
27323	Ru'a wate	Boat.
27324	Ru'a a yu-en	Cochin Chinese boat.
27325	Ru'a cha käa k'am rahm räung	Boat.
27326	Ru'a süa t'ayhn chón	Boat.
27327	Ru'a rón läung loi sintù	Boat.
27328	Ru'a Mangkaun cham laang	Boat.
27329	Ru'a toh k'a mang k'lu'n	Boat.
27330	Ru'a sähng kam häang hahn	Boat.
27331	Ru'a kee len pra laung choong	Boat.
27332	Ru'a krabee prahp mu'-ang mahn	Boat.
27333	Ru'a a sura: wah yup'ak	Boat.
27334	Ru'a suk k'reep k'raung mu'ang	Boat.
27335	Ru'a krut hoen ra: het k'u ch'ak	Boat preceding barges of the royal processions.
27336	Ru'a ake ch'ai hoen hän k'u ch'äk	Boat preceding barges of the royal processions.
27337	Ru'a dang laa ru'a kan	Boat used in royal processions.
27338	Ru'a täung k'wane fäh k'u ch'ak	Boat preceding or following the royal barge.
27339	Ru'a p'rä t'ee nang krai sahn muk king.	Royal barge used in State processions.
27340	Ru'a p'rä t'ee nang see supän hong	Royal barge.
27341	Ru'a p'rä t'ee nang anan ta nahk'a: raht.	Royal barge.
27342	Ru'a p'rä t'ee nang mong k'on su ban.	Royal barge.
27343	Ru'a p'rä t'ee nang suwan róu	Royal barge.
27344	Ru'a p'rä t'ee nang ratana dee lok	Royal barge.
27345	Ru'a p'rä t'ee nang chakrap'at p'eerom.	Royal barge.
27346	Ru'a p'rä t'ee rang see t'iparat.	Royal barge.
27347	Ru'a p'rä t'ee nang p'rä cham t'aweep.	Royal barge.
27348	Ru'a p'rä t'ee nang kéng	Royal barge with a house cover.
27349	Ru'a swaara wehree	Boat.
27350	Ru'a chaláum	Native fishing boat.
27351	Ru'a chaláum p'aa	Native fishing boat.
27352	Ru'a mu'a	An up-country boat.
27353	Ru'a La-ow	Laosian boat.
27354	Ru'a pan loug	Native boat.
27355	Ru'a kraa nauk pahk	Boat.
27356	Ru'a ku laa	Native boat.
27357	Ru'a wate kéng	Native boat.
27358	Ru'a pet	Native boat.
27359	Ru'a maht	Native boat of one log.
27360	Ru'a sam pan pa t'ün	Native boat with cover.
27361	Ru'a mú-ang	Native boat.
27362	Ru'a mang kulaa	Native boat.
27363	Ru'a pai mäh	Native boat.
27364	Ru'a sampán	Native boat.
27365	Ru'a sähläh	Native boat.
27366	Ru'a kái sukaun	Native boat used by pork venders.
27367	P'ra mahäh pée chai rahcha rot	Royal carriage.
27368	Tam näk chán fäh	Building where the king lands (royal landing places).
27369	Ru'an fä ka: dahn	Frame house.
27370	Ru'an fä som ru-et	House with som ru-et partitions.
27371	P'aa	Floating house.
27372	Ru'an kru'-ang p'uk fä chahk	Ordinary house of the poorer classes. Partitions made a species of palm leaf.

THEATRICAL IMAGES.

National Museum Nos.	Siamese names.	English names.
27373	Nàh p'ra-rahm	Face of P'ra-rahm.
27374	Ch'a: dah	A kind of crown.
27375	Rat klau	Head band.
27376	K'raup nàh	Mask.
27377	Nàh Suk'reep	Face of Suk'reep.
27378	Nàh Hanumahn	Face of Hanumahn, giant monkey.
27379	Nàh Ongk'ot	Face of Ongk'ot.
27380	Nàh K'i-ew p'ét	Face of K'i-ew-p'et.
27381	Nàh ling la-ew	Ordinary monkey face.
27382	Nàh T'otsakan	Face of T'otsakan.
27383	Nàh P'ee pake	Face of P'ee pake
27384	Nàh Intarachit	Face of Intarachit.
27385	Nàh Sat'ahsún	Face of Sat'ahsún.
27386	Nàh Wirum cham-bang	Face of Wirum cham-bang.
27387	Nàh Yak sáa nah.	Face of the monster Yak sáa nah.
27388	Pàh lai ki-en taung	Colored cloth with gold hues.
27389	Pahn waan fáh sáung ch'an	Double vase.
27390	Meet k'ohne	Razor.
27391	Meet pauk ma-múang ma-prahng	Knife for preparing mangoes and maprahngs.
27392	Meet k'wáhn let ma-prahng	Knife for picking the meat of the maprahng nut.
27393	Kru'-ang mu' ch'àng k'lu'ng p'a: maun.	Turner's tools.
27394	Kru'-ang mu' ch'àng k'lu'ng mun t'up.	Turner's tools.
27395	Kru'-ang m'u ch'àng k'lu'ng mái.	Wood turning tool.
27396	Kru'-ang m'u ch'àng k'lu'ng mài.	Wood turning tool.
27397	Kru'-ang m'u ch'àng k'lu'ng mài.	Wood turning tool.
27398	Kru'-ang m'u ch'àng k'lu'ng mài.	Wood turning tool.
27399	Kru'-ang m'u ch'àng k'lu'ng mâi.	Wood turning tool.
27400	Kru'-ang m'u ch'àng k'lu'ng mai.	Wood turning tool.
27401	Kru'-ang m'u ch'àng k'lu'ng mài.	Wood turning tool.
27402	Kru'-ang m'u ch'àng k'lu'ng mái	Wood turning tool.
27403	Kru'-ang m'u ch'àng k'lu'ng t'aung paat yahng.	Eight brass turning tools.
27404	Kru'-ang m'u ch'àng k'lu'ng t'aung.	Brass turning tool.
27405	Kru'-ang m'u ch'àng k'lu'ng t'aung.	Brass turning tool.
27406	Kru'-ang m'u ch'àng k'lu'ng t'aung	Brass turning tool.
27407	Kru'-ang m'u ch'àng k'lu'ng t'aung.	Brass turning tool.
27408	Kru' ang m'u ch'àng k'lu'ng t'aung.	Brass turning tool.
27409	Kru'-ang m'u ch'àng k'lu'ng t'aung	Brass turning tool.
27410	Kru'-ang m'u ch'àng k'lu'ng t'aung.	Brass turning tool.
27411	Kru'-ang m'u ch'àng pàn meet ka: lem niing.	Carver's knife.
27412	Kru'-ang m'u ch'àng pan mái, sa: niet ka: dut, saniet mái ma: klúa.	Carver's implements.
27413	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27414	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27415	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27416	Kru'ang m'u ch'àng salak, sin	Chisel for carving or engraving.
27417	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27418	Kru'ang m'u ch'àng salak, sin	Chisel for carving or engraving.
27419	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27420	Kru'ang m'u ch'àng salak, sin	Chisel for carving or engraving.
27421	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27422	Kur'ang m'u ch'àng salak, sin	Chisel for carving or engraving.
27423	Kro'ang m'a ch'àng salak, siu	Chisel for carving or engraving.
27424	Kru'ang m'u ch'àng salak, siu	Chisel for carving or engraving.
27425	Kru'ang m'u ch'àng salak, sin	Chisel for carving or engraving.
27426	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27427	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27428	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27429	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27430	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27431	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27432	Kru'ang m'u ch'àng k'ien p'ukan	Painter's brush.
27433	Kru'ang m'u ch'àng ka:	Engraver's tool.
27434	Kru'ang m'u ch'àng ka:	Engraver's tool.
27435	Kru'ang m'u ch'àng ka:	Engraver's tool.
27436	Kru'ang m'u ch'àng ka:	Engraver's tool.

THEATRICAL IMAGES—Continued.

National Museum Nos.	Siamese names.	English names.
27437	Mâi'niu	Inch rule. (12 Siamese inches = 10 English inches.)
27438	P'ra trah	Royal seal.
27439	P'ra rup	Royal image.
27440	Rot	Carriage.
27441	Ru'an	House.
27442	Ru'-a'	Boat.
27443	P'an	Floating-house.

VARIETIES.

27444	Pähn-chák-wow	Kite-twine; weight, 7 ch'ang, Chinese.
27445	K'on-mën	Porcupine quills, 100 quills.
27446	Tra:	Tortoise shell.
27447	Tra:	Tortoise shell.
27448	Tra:	Tortoise shell.
27449	Tra:	Tortoise shell.
27450	Tra:	Tortoise shell.
27451	Tra:	Tortoise shell.
27452	Tra:	Tortoise shell.
27453	Hala-paughâh	Black wood.
27454	Plaa-yu-en	One Cochin Chinese hammock.

MATS.

27455	Sù'a-K'lâh	K'lâh mat.
27456	Sù'a-K'lâh	K'lâh mat.
27457	Sù'a-K'lâh	K'lâh mat.
27458	Sù'a-K'lâh	K'lâh mat.
27459	Sù'a-K'lâh	K'lâh mat.
27460	Sù'a-K'lâh	K'lâh mat.
27461	Sù'a-kok	Kok mat.
27462	Sù'a-kok	Kok mat.
27463	Sù'a-kok	Kok mat.
27464	Sù'a-kok	Kok mat.
27465	Sù'a-kok	Kok mat.
27466	Sù'a-mâi-lai	Mâi-lai mat.
27467	Sù'a-mâi-lai	Mâi lai mat.
27468	Sù'a-mâi-lai	Mâi-lai mat.
27469	Sù'a-mâi-lai	Mâi lai mat.
27470	Sù'a-mâi-lai	Mâi-lai mat.
27471	Sù'a-wâi	Rattan mat.
27472	Sù'a-wâi	Rattan mat.
27473	Sù'a-wâi	Rattan mat.
27474	Sù'a-wâi	Rattan mat.
27475	Sù'a-wâi	Rattan mat.
27476	Sù'a-lam-paan	Lam-paan mat.
27477	Sù'a-lam-paan	Lam-paan mat.
27478	Sù'a-lam-paan	Lam-paan mat.
27479	Sù'a-lam-paan	Lam-paan mat.
27480	Sù'a-lam-paan	Lam-paan mat.

STONE.

27481	Hin-bot	Stone slab and roller to grind medicines.
27482	Hin-bot	Stone slab and roller to grind medicines.
27483	Hin-bot	Stone slab and roller to grind medicines.
27484	Hin-bot	Stone slab and roller to grind medicines.
27485	Hin-bot	Stone slab and roller to grind medicines.
27486	K'rok-hin	Stone mortar and pestle.
27487	K'rok-hin	Stone mortar and pestle.
27488	K'rok-hin	Stone mortar and pestle.
27489	K'rok-hin	Stone mortar and pestle.
27490	K'rok-hin	Stone mortar and pestle.
27491	K'rok-din	Earthen mortar.
27492	K'rok-din	Earthen mortar.
27493	K'rok-din	Earthen mortar.
27494	K'rok-din	Earthen mortar.
27495	K'rok-din	Earthen mortar.

POTTERY.

National Museum Nos.	Siamese names.	English names.
27496	Màu-k'òw	Rice pot.
27497	Màu-k'òw	Rice pot.
27498	Màu-k'òw	Rice pot.
27499	Màu-k'òw	Rice pot.
27500	Màu-k'òw	Rice pot.
27501	Màu-k'òw	Rice pot.
27502	Màu-kaang	Curry pot.
27503	Màu-kaang	Curry pot.
27504	Màu-kaang	Curry pot.
27505	Màu-kaang	Curry pot.
27506	Màu-kaang	Curry pot.
27507	Màu-kaang	Curry pot.
27508	Gnaup	Farmer's sun hat.
27509	Gnaup	Farmer's sun hat.
27510	Gnâup	Farmer's sun hat.

SPINNING MACHINES.

27511	Nai-pan-fâi	Cotton spinning-wheel.
27512	Nai-pan fâi	Cotton spinning-wheel.
27513	Nai-pan-fâi	Cotton spinning-wheel.
27514	Nai-pan-fâi	Cotton spinning wheel.
27515	Nai-pan-fâi	Cotton spinning wheel.
27516	Kong p'at-fâi	Bow for snapping cotton.
27517	Kong-p'at-fâi	Bow for snapping cotton.
27518	Kong-p'at-fâi	Bow for snapping cotton.
27519	Kong-p'ât-fâi	Bow for snapping cotton.
27520	Kong-p'ât-fai	Bow for snapping cotton.
27521	Heep-bot-fâi	Cotton press.
27522	Heep-bot-fâi	Cotton press.
27523	Heep-bot-fâi	Cotton press.
27524	Heep-bot-fâi	Cotton press.
27525	Heep-bot-fâi	Cotton press.

SUGARS.

27526	Nám-tahn sai-yahng dam-mu'-ang-Sa-soeng-sow.	Black sugar from the Province Sa-soeng-sow; weight, 41 chang.
27527	Nam-tahn sai-k'áw-mu'-ang Sara-buree.	White sugar from the Province Sara-buree: weight, 40 chang.
27528	Nám-tahn sai dam-mu'-ang Chanta-buree.	Black sugar from the Province Chanta-buree; weight, 41 chang.
27529	Nám-tahn sai-k'áw-mu'-ang Nakaun-chai-sée.	White sugar from the Province Nakaun-chai-sée; weight, 40 chang.
27530	Nám-tahn sai-k'áw-mu'-ang Rahcha buree.	White sugar from Rahcha buree: weight, 38 chang.
27531	Nam-tahn sai-k'áw-raang-mu'-ang-Nakaun-chai-sée.	Inferior white sugar from Nakaun-chai-sée; weight, 38 chang.
27532	Nám tahn rohng-chak-nauk-mu-ang Nakaun-chai-sée.	Sugar from the foreign steam sugar mill at Nakaun-chai-sée: weight, 38 chang (48 pounds English).
27533	Nám-tahn sai-rohng-chak-nai-mu'-ang-Nakaun-chai-sée.	Sugar from native steam sugar mill at the Province Nakaun-chai-sée; weight, 33 chang (44 pounds English).
27534	Nam-tahn sai-dam-mu'-ang-Nakaun-chai-sée.	Brown sugar from Nakaun-chai-sée; weight, 41 chang.
27535	Nám-tahn sai-k'áw, mu'-ang.Sa-soeng-sow.	White sugar from Province Sasoeng-sow; weight, 38 chang.

MISCELLANEOUS.

27536	Nang-sú'a-lai-talap	Tiger's skin, spotted.
27537	Nang-ch'ä-mot	Muskrat skin.
27538	P'on-du'-eh	A kind of barley; weight, 35¼ chang.
27539	Gnu-lú-am	Boa constrictor's skin.
27540	Gnu-láhm	Skin of a small species of boa.
27541	Gnu-láhm	Skin of a small species of boa.
27542	Nâu-mái-Lâang	Dried bamboo sprouts; weight, 13 chang.
27543	Rong	Gum gamboge: weight, 34½ chang.
27544	Kee p'ung	Beeswax: weight, 34½ chang.

MISCELLANEOUS—Continued.

National Museum Nos.	Siamese names.	English names.
27545	Dai-dip	Cotton yarn: weight, 5 chang.
27546	Mái-ku-ep	Twisted silk, one twist.
27547	Mái-láo	Laos silk, two twists.
27548	Mái-láo	Laos silk, two twists.
27549	P'on-raaw	Bastard cardamoms; weight, 21¼ chang.
27550	P'on-kra; wahn-Pohtesat	Cardamoms from the Province Pohtesat; weight, 13 chang.
27551	Pling-ta: laa	Sea leech (beche-de-mere); weight, 18¼ chang.
27552	Pon-kra-bow	Krabow seed: weight, 40 chang.
27553	Krang	Shellac: weight, 28 chang.
27554	Pon-kra: wahn Matabaung	Bastard cardemoms from Province Matabong; weight, 9¼ chang.
27555	Klet-lin	
27556	Met-la-hüng	Castor oil beans: weight, 28 chang.

TOBACCOS.

National Museum Nos.	Siamese names.	English names.
27557	Yah dee, mu'ang Kahncha-buree	Best Kanburee tobacco.
27558	Yah klahng, mu'-ang-t'aung	Medium tobacco from Province of Angt'aung.
27559	Yah Klahng, mu'-ang Nak-aun-chai-sée.	Medium tobacco from the Province of Nakaun-chai-sée
27560	Yah klahng, mu'-ang Pétch'a buree.	Medium tch'a Péburee tobacco.
27561	Yah lew, mu'-ang Bang-ch'ähng	Inferior tobacco from the Province of Bang-ch'ahng.
27562	Yah lew, mu'-ang Nakaun-chai-sée	Inferior Nakaun-chai-sée tobacco.
27563	Yah klahng, Bang-ch'ähng	Medium Bang-ch'ähng tobacco.
27564	Yah lew, Saraburee	Inferior Saraburee tobacco.
27565	Yah lew, mu'-ang Lak'aun	Inferior Ligore tobacco.
27566	Yah lew, mu'-ang Kahnchaburee	Inferior Kahnchaburee tobacco.
27567	Yah lew, mu'-ang P'etachaburee	Inferior P'etchaburee tobacco.
27568	Yah dee, Saraburee	First class Saraburee tobacco.
27569	Yah lew, mu'-ang, Angtaiung	Inferior Angtaiung tobacco.
27570	Yah dee, mu'-ang Lak'aun	First-class Ligore tobacco.
27571	Yah klahng mu'-ang Saraburee	Medium Saraburee tobacco.
27572	Yah dee Bahng-ch'ähng	First-class Bahng-ch'ähng tobacco.
27573	Yah klahng, mu'-ang Kahncha-buree.	Kahnaburee medium tobacco.
27574	Yah dee, mu'-ang P'etchaburee	First-class P'etchaburee tobacco.
27575	Yah dee, mu'-ang Nakaun-chai-see.	First-class Nakaun-chai-sée tobacco.
27576	Yah dée, mu'-ang Angt'aung	First-class Angt'aung tobacco.

MISCELLANEOUS.

National Museum Nos.	Siamese names.	English names.
27577	P'rik t'ai dam	Black pepper.
27578	F'ái bot	Cleaned cotton.
27579	Nàng Nąhk	Three beavers' skins.
27580	Pau	Hemp bark.
27581	K'ón-nok-kra: ten	Two hundred king-fishers' feathers.
27582	Prik-t'ai-k'áw	White pepper; weight, 21 chang.
27583	Nâm-man-k'wai	Buffalo oil: weight 12 chang.
27584	Rang-nok-yahng-dee	First-class edible birds' nests: weight, 1½ chang.
27585	W'ai-ta: k'ah	Ta: kah rattan.
27586	W'ai-ta-k'ah	Ta: kah rattan.
27587	Rang-nok-yahng klahng	Edible birds' nests, medium quality: weight, 1½ chang.
27588	Pähn-bai	Hemp cloth; weight, 1 chang.
27589	K'rahn	Indigo, half-bucket.

SEEDS.

National Museum Nos.	Siamese names.	English names.
27590	G'nah-met-krung-käw	Tulseed from Aguthiee, the old capital.
27591	G'nah-met-mu'-ang-su-p'anta-buree.	Tulseed from the Province of Supan.
27592	T'u-a-k'ów	White beans.
27593	T'u-a-ton-tai	Tai beans.
27594	T'u-a-t'aung	Taung (gold) beans.
27595	T'u-a-loh-song	Soh song beans.
27596	G'nah-met-mu'-ang-Rachah-buree.	Rachaburee teelseed.
27597	T'u-a-dam-lek	Small black beans.
27598	T'u-a-dam-yäi	Large black beans.
27599	T'u-a-k'i-eu	Green beans.

SEEDS—Continued.

National Museum Nos.	Siamese names.	English names.
27600	T'äi-k'u	Plow for a pair of buffaloes.
27601	T'äi-dee-ow	Plow for single buffalo.
27602	K'raht-yah	Rake.
27603	K'raht-chak-yah	Rake to drag grass or hay.
27604	K'raht-soug-yah	Rake to hand up grass or hay.
27605	L'u-an-lahk-k'òw	An implement to drag rice.
27606	Mâi-hú-a-yoke	An implement.
27607	Mâi-keep-mú	An implement.
27608	Mái-ka: túng	An implement.
27609	Chaup	An implement to break up earth.
27610	Si-em	An implement to dig the earth.
27611	Ki-ew-kl-ew-k'òw	An instrument to reap paddy. Sickle.
27612	P'râh-hu-ot	Grass cutter.
27613	K'an-láu-bahp-k'òw	A Laosian shoulder-stick for carrying burdens.
27614	K'áu-chái	A kind of sickle.
27615	Sée-k'ow	Rice mill or grinder.
27616	Sée-fat	Husk blower.
27617	Ka: du'-ang-tam-k'òw	Foot pestle for pounding rice.
27618	K'rok-tam-k'òw	Wood mortar to pound rice in.
27619	Sahk-tam-k'òw	Wooden pestle for rice mortar.
27620	K'rok-ka: du'-ang	A kind of mortar for the pestle No. 27617.
27621	Ta: lam-p'uk-tam-k'òw	A kind of pestle used by hand.
27622	K'òw-lú'-ang-háum	Yellow fragrant rice, gathered five months after planting.
27623	K'òw-lú'-ang-pahn-t'aung	Luang p'ahn taung rice, gathered six months after planting.
27624	K'òw-kém-taung	K'em taung rice, gathered six months after planting.
27625	K'òw-champah-t'aung	Champah t'aung rice, gathered five months after planting.
27626	K'òw-kan-chut	Kanchut rice, gathered five months after planting.
27627	K'òw háng	Háng rice, gathered five months after planting.
27628	K'òw nahng háum	Nahng haum rice, gathered six months after planting.
27629	K'òw k'áw sang sot	White sung sot rice, gathered seven months after planting.
27630	K'òw k'áw ch'aw wang	White chaw wang rice, gathered three months after planting.
27631	K'òw k'áw k'amane	White Cambodian rice, gathered three months after planting.
27632	K'òw p'ra: yah chóm	Pru: yah chóm rice, gathered three months after planting.
27633	K'òw lu-ang p'u-ang	Yellow P'u-ang rice, gathered three months after planting.
27634	K'òw t'aung mah k'aak	Taung mah k'aak rice, gathered eight months after planting.
27635	K'òw k'áw tah chú-i	White tah chú-i rice, gathered eight months after planting.
27636	K'òw nahng k'äi	Nahng k'äi rice, gathered five months after planting.
27637	K'òw hin sàun	Hin sàun rice, gathered six months after planting.
27638	K'òw ta: sú-i	Ta: sú-i rice, gathered four months after planting.
27639	K'òw käan chan	Käan chan rice, gathered five months after planting.
27640	K'ow ta: p'ahp nàm	Ta: p'ahp nàm rice, gathered six months after planting.
27641	K'òw p'u-ang mah lai	P'u-ang mah lai rice, gathered five months after planting.
27642	K'òw lam yai	Lam yai rice, gathered six months after planting.
27643	K'òw nàm p'úng	Nám p'úng (honey) rice, gathered six months after planting.
27644	K'òw chàu ma-prahng	Chàu ma-prahng rice, gathered three months after planting.
27645	K'òw käan ma: klú-a	Käan ma klú-a rice (ebony rice), gathered three months after planting.
27646	K'òw nu-en taang	Nu en taang rice, gathered three months after planting.
27647	K'òw dam k'wan t'i-en	Dam k'wan t'i-en rice, gathered five months after planting.
27648	K'òw kew klahng	Kew klahng rice, gathered six months after planting.
27649	K'òw sòi t'aung	Sòi t'aung rice, gathered six months after planting.
27650	K'òw háng màh sée make	Háng màh sée make rice, gathered six months after planting.
27651	K'òw p'lai gnahm	P'lai gnahm rice, gathered seven months after planting.
27652	K'òw kra: duk ch'àng	Kra: duk ch'àng (elephant bone) rice, gathered seven months after planting.
27653	K'òw lu'ang	Lu'ang (yellow) rice, gathered seven months after planting.
27654	K'òw daang	Daang (red) rice, gathered seven months after planting.
27655	K'òw nahng ta: k'raung	Nahng ta: k'raung rice, gathered seven months after planting.
27656	K'òw gnah chàhng	Gnah chàhng rice, gathered seven months after planting.
27657	K'òw pa: màh	Pa: mah rice, gathered eight months after planting.
27658	K'òw k'áw	K'áw rice (white), gathered eight months after planting.
27659	K'òw bahng maun	Bahng maun rice, gathered eight months after planting.
27660	K'òw taung gnahm	Taung gnahm rice, gathered eight months after planting.
27661	K'òw k'áw yai	K'áw yai (large white) rice, gathered eight months after planting.
27662	K'òw chet p'ak	Chet p'ak rice, gathered eight months after planting.
27663	K'òw som bun	Som bun rice, gathered eight months after planting.
27664	K'òw pu-ang ma: hote	Pu-ang ma: hote rice, gathered six months after planting.
27665	K'òw sòi sa: wing	Sòi sa: wing rice, gathered six months after planting.
27666	K'òw sái bu-a	Sái bu-a rice, gathered seven months after planting.
27667	K'òw haum nak	Haum nak rice, gathered seven months after planting.
27668	K'òw k'áu pù-ang	K'áu pù-ang rice, gathered eight months after planting.
27669	K'òw daang sai	Daang sai rice, gathered eight months after planting.

SEEDS—Continued.

National Museum Nos.	Siamese names.	English names.
27670	K'òw k'áw sup'an	White sup'an rice, gathered five months aftor planting.
27671	K'òw yùng ta: lai	Yung ta: lai rice, gathered seven months after planting.
27672	K'òw kret	Kret rice, gathered seven months after planting.
27673	K'òw kòw	Kèw rice, gathered seven months after planting.
27674	K'òw k'áw koh:	K'áw koh: rice, gathered seven months after planting.
27675	K'òw t'aung suk	T'aung suk rice, gathered seven months after planting.
27676	K'òw t'aung ta: nee	T'aung ta: nee rice, gathered eight months after planting.
27677	K'òw Pàum	Pàum rice, gathored eight months after planting.

GLUTINOUS GRAIN.

National Museum Nos.	Siamese names.	English names.
27678	K'òw rahk klu-i	Rahk-klu-i rice, gathered six months after planting.
27679	K'òw nok ka: tah	Nok ka: tah, partridge rice, gathered seven months after planting.
27680	K'òw dauk ka: nahk	Dauk ka: nahk rice, gathered eight months after planting.
27681	K'òw tòm	Tòm rice, gathered six months after planting.
27682	K'òw poht k'ow chòw	Short stock paddy.
27683	K'òw p'oht k'ow ni-ew	Short stock glutinous rice.
27684	K'òw fahng k'òw chow	Long stock rice.
27685	K'òw fahng k'òw ni-ew	Long stock glutinous paddy.
27686	K'òw fahng háng ch'áhng	Long stock hàng chàhng (elephant tail) rice.
27687	K'òw sa: mut koh dom	Sa: mut koh dom rice.
27688	P'ón du-ai plu-ak	Barley unshelled.
27689	P'ón du-ai sàum	Barley husked (cleaned).
27690	Ki-en ka: t'aa	Cart wagon.
27691	K'ów kra: bu' p'u-ak k'ü	A pair of white buffalo horns.
27692	K'ów kra: bu' dam k'ü	A pair of black buffalo horns.
27693	P'lu-a lek	An iron spade.
27694	P'lu-a mâi	A wooden spade.
27695	Ta: kraang raun-k'ow hähng	Coarse sieve for sifting rice.
27696	Ta: kraang raun-k'ow t'ëe	A fine sieve for sifting rice.
27697	Kra: bung	A basket.
27698	Kra: dong	A bamboo basket rice cleaner.

SPECIMENS OF WOOD.

National Museum Nos.	Siamese names.	English names.
84	Mâi chan t'ü' an	Wild sandal wood.
85	Mâi yung	Yung wood.
86	Mâi chan ta: tip	Chan ta: tip wood.
87	Mâi son	Pine wood or son wood.
88	Mâi ta: baak	Ta: baak wood.
89	Mâi klet lin	Klet lin wood.
90	Mâi pohng	Pohng wood.
91	Mâi guah ch'áng	Ivory wood.
92	Mâi nah see	Nah see wood.
93	Mâi samak	Samak wood.
94	Mâi chahng	Chahng wood.
95	Mâi nahng pron	Nahng pron wood.
96	Mâi ta: k'ien	Ta: k'ien wood (heavy).
97	Mâi ch'ang yake	Ch'áng wood.
98	Mâi ka: bow	Ka: bow wood.
99	Mâi teen pet	Teen pet wood.
100	Mâi nah ruet	Nah ruet wood.
101	Mâi in ta: nin	In ta: nin wood.
102	Mâi ka: bahk	Ka: bahk wood.
103	Mâi ch'am ch'áh	Ch'am ch'áh wood (pine).
104	Mâi P'a: wah	P'a: wah wood.
105	Mâi nahk but	Nahk but wood.
106	Mâi kra: t'ing	Kra: t'ing wood.
107	Mâi rak	Rak wood (lacker tree).
108	Mâi k'râi	K'râi wood.
109	Mâi lum p'an	Lum p'an wood.
110	Mâi yahng	Yahng wood.
111	Mâi ta: bun	Ta: bun wood.
112	Mâi man mü	Man mü wood.
113	Mâi ki'em	K'iem wood.
114	Mâi ka: t'ang	Ka: t'ang wood.
115	Mâi rak	Rak wood.
116	Mâi p'oh ta: laa	Poh ta: laa wood.
117	Mâi guah ch'áng	Guah ch'áng wood, ivory wood.
118	Mâi ta: lum	Ta: lum wood.
119	Mâi kate	Kate wood.
120	Mâi ulohke	Ulohke wood.
121	Mâi küm	Küm wood.
122	Mâi sahk	Sahk wood.
123	Mâi hieng	Hieng wood.

SPECIMENS OF WOOD—Continued.

National Museum Nos.	Siamese names.	English names.
124	Mâi má: k'âh	Má: k'âh wood.
125	Mâi dam dong	Dam dong wood.
126	Mâi ta: bake	Ta: bake wood.
127	Mâi chan ta: t'it	Chan ta: t'it wood.
128	Mâi ka: tang	Ka: tang wood.
129	Mâi t'uri-en	Durian wood.
130	Mâi bariwane	Bariwane wood.
131	Mâi chneng	Chneng wood.
132	Mâi wâh	Wâh wood.
133	Mâi sahn	Sáhn wood.
134	Mâi pi-et	Pi-et wood.
135	Mâi suri en	Suri-en wood.
136	Mâi bariwane	Bariwane wood.
137	Mâi Non	Non wood.
138	Mai gnaun kâi	Gnaun kâi wood (cockscomb wood).
139	Mâi nahk but	Nahk but wood.
140	Mai prohng	Prohng wood.
141	Mâi tanghon	Tanghon wood.
142	Mâi pohng	Pohng wood.
143	Mâi pe:	Pe: wood.
144	Mâi chahng	Chahng wood.
145	Mai k'a: nun	Jack fruit tree wood.
146	Mâi ni-en pâh	Ni-en p'âh wood.
147	Mâi sang ka: t'am	Sang ka: t'am wood.
148	Mâi nok naun	Nok naun wood.
149	Mâi k'âh nahng	K'âh nahng wood.
150	Mâi man mû	Man mû wood.
151	Mâi mang k'a	Mang k'a wood.
152	Mâi lam paan	Lam paan wood.
153	Mâi Kohng Kahng	Kohng Kahng wood.
154	Mâi ma: prahng	Ma: prahng wood.
155	Mai K'raang	K'raang wood.
156	Mâi Ka: t'aun	Ka: t'aun wood.
157	Mâi Rak	Rak wood.
158	Mâi sú em	Su-em wood.
159	Mâi prĩng	Prĩng wood.
160	Mâi in ta nin	In ta nin wood.
161	Mâi ta: k'i-en sai	Ta:k'i-en sai wood.
162	Mai p'ong	P'ong wood.
163	Mâi K'aa	K'aa wood.
164	Mâi Krai	Krai wood.
165	Mâi p'lap	P'lap wood.
166	Mâi teen pet	Teen pet wood.
167	Mai ch'ah mueng	Ch'ah mueng wood.
168	Mâi lu-'et k'wai	Lu'et k'wai wood (buffalo blood wood).
169	Mai pa: ni-eng	Pa: nieng wood.
170	Mâi ka: ri-eng	Ka: ri eng wood.
171	Mai Mang kahn	Mang kahn wood.
172	Mâi gnah ch'ahng	Gnah ch'ahng wood.
173	Mâi yahng ka: si-en	Yahng ka: si-en wood.
174	Mâi ta: koh	Ta: koh wood.
175	Mâi si-et sau	Si-et sau wood.
176	Mâi ka: náhn	Ka: náhn wood.
177	Mâi ta: k'i-en sahm p'aun	Ta: k'i-en sahm p'aun wood.
178	Mâi sai bu'aug	Sai bu'ang wood.
179	Mâi ti-eu	Ti-eu wood.
180	Mâi ta: k'i-en	Ta: k'i-en wood.
181	Mâi kra: ráa	Kra: ráa wood.
182	Mâi p'om gnuet	P'om wood.
183	Mâi yung	Yung wood.
184	Mâi kau mû	Kau mû wood.
185	Mâi mak	Mak wood.
186	Mâi p'a: wah	P'a: wáh wood.
187	Mâi sang kri-et	Sang kri-et wood.
188	Mâi li-en	Li-en wood.
189	Mâi champah	Champah wood.
190	Mai chung ku-et	Chung ku-et wood.
191	Mâi ta: taaw	Ta: taaw wood.
192	Mâi p'ai	Bamboo.
193	Mâi ka: baak	Ka: baak wood.
194	Mâi lahw	Lahw wood.
195	Mâi ku-epnak sahm-tam lung chin	Ku-ep wood; weight, 3 tam lung, Chinese.
196	Mâi sak yâi raup sig-kaw kam	One round block teak wood, semi-circumference, 19 kam; weight, 14 ch'ang.
197	Mâi sak k'ee k'wai pâan	K'ee k'wai teak plank
198	Mâi sak t'aung pâan	T'aung pâan (golden) teak plank.
199	Mâi lahw	Laosian silk: weight, 8 tam lung, Chinese.
200	Dai dip	Cotton yarn: weight, 5 chang Chinese.

MINERAL ORES.

National Museum No.	Siamese names.	English names.
20000	Ràa-galena	Galena from the Province Pa: láh.
20001	Ràa t'aung kam	Gold from the Province Krabin.
20002	Ràa t'aung-daang	Copper from the Province Chant'uk, under the jurisdiction of the Province Koraht.
20003	Ràa-dee-buk	Tin from the Province Ranaung.
20004	Ràa-dee-buk	Second-class tin: another quality found in the plains, white, in the Province Roket.
20005	Ràa-dée-buk	Tin found in the Province Prachuep.
20006	Ràa-pru-ang	Antimony mixed with gold, found in the stream Nam It, in Poket.
20007	Ràa-mú-ang yai	Ores from the great mineral district.
20008	Ràa-tée-sam	Third-class ore, found in yellow soil, mixed with red stones, in Poket.
20009	Ràa-pru-ang	Antimony attached to rock, at an island near the sea-shore, at Poket.
20010	Yahng-k'iem-pa-naung	Copal varnish gum.
20011	Ràa-lek	Iron ore found in the Province Singora.
20012	Ràa-t'ee nüng	An ore found back of mountains, in the Province Poket.
20013	Ràa	Ore at Koh-Ohang Island, in the Ranaung Province.
20014	Ràa-ka ow	Granular-iron pyrites, "white ore" from Ranaung Province.
20015	Ràa-koh-Chang	Ore from Koh-Chang Island.

RICE IN BOTTLES.

Káu-ká: máne	Rice made of each of these kinds of unglutinous paddy.
Luang-pu-eng	
Paum	
Tachu-i	Rice made of each of these kinds of unglutinous paddy.
Kau-chut	
Kew	
Chan-ma: prahng	Rice made of each of these kinds of glutinous paddy.
Pú-eng-mahlai	
Ta: su-i	
Lúang-háum	Rice made of each of these kinds of unglutinous paddy.
Hahng-ma: sée make	
Taung-gnahm	
Káu-yài.	Rice made of each of these kinds of unglutinous paddy.
Plat gnahm	
Sòi-taung	
Káu-cháw wang	Rice made of each of these kinds of unglutinous paddy.
Kret	
Champah t'aung	
Hang	Rice made of each of these kinds of unglutinous paddy.
Taung-suk	
Taung-mah-kauk	
Kaan-chan	Rice made of each of these kinds of glutinous paddy.
Nok-kra-tah	
Nâm p'ung	
S'ai bua.	Rice made of each of these kinds of unglutinous paddy.
K'áu-gnah-cháng	
Káw	
Bahng-maun	Rice made of each of these kinds of unglutinous paddy.
P'ra: yah-ch'om	
Nahny ta: k'aun	
L'uang-pahn-táung	Rice made of each of these kinds of unglutinous paddy.
L'uang	
Haum-nak	
P'a: mah	Rice made of each of these kinds of unglutinous paddy.
P'ueng-ma: hote	
Chet-pak.	
Daany	Rice made of each of these kinds of unglutinous paddy.
K'aú-pu-eng	
Kaú-sang-sot	
Soì-aa: sawing	Rice made of each of these kinds of unglutinous paddy.
K'áw-kaw	
Hin	
Kaw-klahng	Rice made of each of these kinds of glutinous paddy.
Dank-kra: nahk	
Dam-yäi	
Dam-kwan-t'i-em	Rice made of each of these kinds of glutinous paddy.
Ta: páh-nâm	
Nueu-taang	
K'ra duk-ch'á'ng	Rice made of each of these kinds of unglutinous paddy.
K'em t'aung	
Nahng-käi	

REPORT

ON THE

PARTICIPATION OF THE TREASURY DEPARTMENT

IN THE

INTERNATIONAL EXHIBITION OF 1876.

Hon. R. W. TAYLER, 1st Comptroller,

Representative of Treasury Department at International Exhibition, 1876.

WASHINGTON:
GOVERNMENT PRINTING OFFICE
1884.

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THE TREASURY DEPARTMENT.

SECRETARIES OF THE TREASURY.

1789 to 1876.

Names.	Whence appointed.	Date of commission.	Expiration of service.
Alexander Hamilton	New York	Sept. 11, 1789	Jan. 31, 1795
Oliver Wolcott, jr	Connecticut	Feb. 2, 1795	Dec. 31, 1800
Samuel Dexter	Massachusetts	Jan. 1, 1801	May 6, 1801
Albert Gallatin	Pennsylvania	May 14, 1801	Apr. 20, 1813
George W. Campbell	Tennessee	Feb. 9, 1814	Sept. 26, 1814
Alexander J. Dallas	Pennsylvania	Oct. 6, 1814	Oct. 21, 1816
William H. Crawford	Georgia	Oct. 22, 1816	Mar. 3, 1825
Richard Rush	Pennsylvania	Mar. 7, 1825	Mar. 3, 1829
Samuel D. Ingham	Pennsylvania	Mar. 6, 1829	June 20, 1831
Louis McLane	Delaware	Aug. 8, 1831	May 29, 1833
William J. Duane	Pennsylvania	May 29, 1833	Sept. 23, 1833
Roger B. Taney	Maryland	Sept. 23, 1833	June 24, 1834
Levi Woodbury	New Hampshire	June 27, 1834	Mar. 4, 1841
Thomas Ewing	Ohio	Mar. 5, 1841	Sept. 11, 1841
Walter Forward	Pennsylvania	Sept. 13, 1841	Feb. 28, 1843
John C. Spencer	New York	Mar. 3, 1843	May 2, 1844
George M. Bibb	Kentucky	June 15, 1844	Mar. 7, 1845
Robert J. Walker	Mississippi	Mar. 6, 1845	Mar. 5, 1849
William M. Meredith	Pennsylvania	Mar. 8, 1849	July 22, 1850
Thomas Corwin	Ohio	July 23, 1850	Mar. 7, 1853
James Guthrie	Kentucky	Mar. 7, 1853	Mar. 6, 1857
Howell Cobb	Georgia	Mar. 6, 1857	Dec. 8, 1860
Philip F. Thomas	Maryland	Dec. 12, 1860	Jan. 14, 1861
John A. Dix	New York	Jan. 11, 1861	Mar. 6, 1861
Salmon P. Chase	Ohio	Mar. 7, 1861	June 30, 1864
William P. Fessenden	Maine	July 1, 1864	Mar. 3, 1865
Hugh McCulloch	Indiana	Mar. 7, 1865	Mar. 4, 1869
George S. Boutwell	Massachusetts	Mar. 11, 1869	Mar. 16, 1873
William A. Richardson	Massachusetts	Mar. 17, 1873	June 3, 1874
Benjamin H. Bristow	Kentucky	June 4, 1874	June 20, 1876
Lot M. Morrill	Maine	June 21, 1876	....

OFFICERS OF THE TREASURY DEPARTMENT DURING THE CENTENNIAL YEAR.

Names.	Whence appointed.	Date of commission.	Expiration of service.
SECRETARIES.			
Benjamin H. Bristow	Kentucky	June 4, 1874	June 20, 1876
Lot M. Morrill	Maine	June 21, 1876	....
ASSISTANT SECRETARIES.			
Charles F. Conant	New Hampshire	July 1, 1874	....
Curtis F. Burnam	Kentucky	May 4, 1875	July 1, 1876
Henry F. French	Massachusetts	Aug. 7, 1876	....
FIRST COMPTROLLER.			
Robert W. Taylor	Ohio	Jan. 14, 1863	....
Deputies.			
William Hemphill Jones	Delaware	July 1, 1875	Sept. 4, 1876
Jonathan Tarbell	Mississippi	Aug. 25, 1876	....

OFFICERS OF THE TREASURY DEPARTMENT, ETC.—Continued.

Names.	Whence appointed.	Date of commission.	Expiration of service.
SECOND COMPTROLLER.			
John M. Brodhead	Dist. of Columbia.	May 28, 1863	Jan. 23, 1876
Cyrus C Carpenter	Iowa	Jan. 7, 1876	....
Deputies.			
Edmund B. Curtis	New York	July 1, 1875	Jan. 16, 1876
Reuben Williams	Indiana	Jan. 7, 1876	July 15, 1876
James S. Delano	Illinois	July 21, 1876	....
COMMISSIONER OF CUSTOMS.			
Henry C. Johnson	Pennsylvania	Apr. 14, 1874	....
Deputy.			
Henry A. Lockwood	Wisconsin	July 1, 1875	....
FIRST AUDITOR.			
David W. Mahon	Pennsylvania	Dec. 21, 1871	....
Deputy.			
Henry K. Laver	New Hampshire	July 1, 1875	....
SECOND AUDITOR.			
Ezra B. French	Maine	Aug. 17, 1861	....
Deputy.			
Charles F. Herring	Massachusetts	July 1, 1875	....
THIRD AUDITOR.			
Allan Rutherford	North Carolina	Apr. 21, 1870	Jan. 14, 1876
Horace Austin	Minnesota	Jan. 7, 1876	....
Deputy.			
Allen M. Gangewer	Ohio	July 1, 1875	....
FOURTH AUDITOR.			
Stephen J. W. Tabor	Iowa	June 1, 1863	....
Deputy.			
William B. Moore	Ohio	July 1, 1875	....
FIFTH AUDITOR.			
Jacob H. Ela	New Hampshire	Jan. 1, 1872	....
Deputy.			
Jonathan B. Mann	Massachusetts	July 1, 1875	....
SIXTH AUDITOR.			
Jacob M. McGrew	Ohio	July 1, 1875	....
Deputy.			
Frederick B. Lilley	New York	July 1, 1875	....
TREASURER.			
John C. New	Indiana	July 1, 1875	July 8, 1876
Albert U. Wyman	Wisconsin	July 1, 1876	....
Assistants.			
Albert U. Wyman	Wisconsin	Mar. 18, 1875	July 8, 1876
James Gilfillan	Connecticut	June 29, 1876	....

OFFICERS OF THE TREASURY DEPARTMENT, ETC.—Continued.

Names.	Whence appointed.	Date of commission.	Expiration of service.
REGISTER.			
John Allison	Pennsylvania	Apr. 3, 1869	
Deputy.			
William P. Titcomb	Massachusetts	July 1, 1875	
COMPTROLLER OF THE CURRENCY.			
John Jay Knox	Minnesota	Apr. 25, 1872	
Deputy.			
John S. Langworthy	New York	July 1, 1875	
COMMISSIONER OF INTERNAL REVENUE.			
Daniel D. Pratt	Indiana	May 15, 1875	Aug. 2, 1876
Green B. Raum	Illinois	Aug. 2, 1876	
Deputy.			
Henry C. Rogers	Pennsylvania	Nov. 23, 1871	
DIRECTOR OF THE MINT.			
Henry R Linderman	Pennsylvania	Dec. 8, 1873	
SUPERVISING ARCHITECT.			
William A. Potter	New York	Jan. 1, 1875	Aug. 11, 1876
James G. Hill	Massachusetts	Aug. 11, 1876	
SUPERVISING INSPECTOR-GENERAL OF STEAMBOATS.			
William Burnett	Massachusetts	Dec. 23, 1874	Nov. 23, 1876
James A. Dumont	New York	Nov. 23, 1876	
CHIEF OF BUREAU OF STATISTICS.			
Edward Young	Pennsylvania	July 1, 1870	
SUPERVISING SURGEON-GENERAL.			
John M. Woodworth	Illinois	Mar. 3, 1875	
CHIEF OF THE BUREAU OF ENGRAVING AND PRINTING.			
George B. McCartee	New York	Mar. 17, 1869	Feb. 21, 1876
Henry C. Jewell	Dist. of Columbia	Feb. 28, 1876	
SUPERINTENDENT OF COAST SURVEY.			
Carlisle P. Patterson	California	Feb. 17, 1874	

ORGANIZATION OF THE TREASURY DEPARTMENT.

The Treasury Department was established by the act of Congress approved September 2, 1789.

The officers provided for were a Secretary of the Treasury, to be deemed head of the Department, a Comptroller, an Auditor, a Treasurer, a Register, and an Assistant to the Secretary of the Treasury, to be appointed by him. The other officers named were to be appointed by the President with the advice and consent of the Senate.

The Department so created was capable of indefinite expansion, to meet the growth of the country and of its business; and, preserving its organization, there are now two assistants to the Secretary, two Comptrollers, a Commissioner of Customs, a Comptroller of the Currency, a Commissioner of Internal Revenue, six Auditors, a Treasurer, a Register, and a Superintendent of the Coast Survey, each of whom is appointed by the President with the advice and consent of the Senate.

The Comptrollers, the Commissioner of Customs, the Auditors, the Comptroller of the Currency, and the Register, have each a deputy, and the Treasurer an assistant, appointed by the President with the advice and consent of the Senate.

There are also a Supervising Architect of the Department; a chief of the Bureau of Engraving and Printing, and a chief of the Bureau of Statistics, who are appointed by the Secretary.

The duties of the Secretary and other officers of the Department remain much the same as at first, though in some instances enlarged, and in others divided between the old and new officers; and, in some others where new duties have been prescribed, new offices have been created, as in the cases of the Comptroller of the Currency and the Commissioner of Internal Revenue; and in yet other instances transfers have been made to other Departments, but the general organization retains its original form.

By the act of 1789 it was made the duty of the Secretary of the Treasury to digest and prepare plans for the improvement and management of the revenue, and for the support of public credit, to prepare and report estimates of the public revenue and the public expenditures; to superintend the collection of the revenue; to decide on the forms of keeping and stating accounts and making returns, and to grant, under the limitations established or to be provided, all warrants for moneys to be issued from the Treasury, in pursuance of appropriations by law;

to execute such services relative to the sale of the lands belonging to the United States as might be by law required of him; to make report and give information to either branch of the legislature, in person or in writing (as he might be required), respecting all matters referred to him by the Senate or House of Representatives, or which shall appertain to his office; and, generally, to perform all such services relative to the finances as he should be directed to perform.

The duties of the Secretary have been, in many things, increased at various times, and in many instances during and since the late war, especially in relation to the issue and redemption of United States securities and notes.

The Assistant Secretaries discharge such duties as may be required of them by the Secretary; and one of them, designated by the President, acts as Secretary in the absence of that officer; and one of them, appointed for that purpose by the Secretary, signs warrants for the payment of money into the Treasury, and warrants for the payment of accounts settled and allowed by the accounting officers of the Department.

The act of 1789 made it the duty of the Comptroller to superintend the adjustment and preservation of the public accounts; to examine all accounts settled by the Auditor, and certify the balances arising thereon to the Register; to countersign all warrants drawn by the Secretary of the Treasury which should be warranted by law; to report to the Secretary the official forms of all papers to be issued in the different offices for collecting the public revenue, and the manner and form of keeping and stating the accounts of the several persons employed therein; and also to provide for the regular and punctual payment of all moneys which might be collected, and direct prosecutions for all delinquencies of officers of the revenue, and for debts that were or should be due to the United States.

The powers and duties of the Comptroller—now the First Comptroller—remain the same, except in relation to portions transferred to the Second Comptroller and the Commissioner of Customs.

The duties of the Treasurer were to receive and keep the moneys of the United States, and to disburse the same upon warrants drawn by the Secretary of the Treasury, countersigned by the Comptroller, and recorded by the Register, and not otherwise. He was required to render accounts quarterly, and at all times to submit to the Secretary of the Treasury and the Comptroller, or either of them, the inspection of the moneys on hand; and various acts directed specifically and more in detail the manner in which the duties of the office should be discharged.

It was made the duty of the Auditor to receive all public accounts, and, after examination, to certify the balance and transmit the accounts with the vouchers and certificate to the Comptroller for his decision.

The Register was required to keep all accounts of the public money, and of all debts due to or from the United States, to receive from the

Comptroller the accounts which shall have been finally adjusted, and to preserve such accounts with their vouchers and certificates; to record all warrants for the receipt or payment of moneys at the Treasury, certify the same thereon, and to transmit to the Secretary of the Treasury copies of certificates of balances of accounts as adjusted. Subsequently the Register was required to perform various duties in relation to the issue and transfer of certificates of the public debt.

By act of March 3, 1817, one Comptroller and four Auditors were added to the Department; by act of July 2, 1836, one additional Auditor for Post-Office accounts; by act of March 3, 1849, a Commissioner of Customs, who, as to customs' accounts, was authorized to decide upon the same, as had been previously the duty of the First Comptroller.

By other provisions the Commissioner of the General Land Office (an officer of the Department of the Interior) audits all accounts relative to the public lands, and reports them to the First Comptroller for decision, in the same manner as other accounts are reported by an Auditor.

The First Auditor receives and examines all accounts accruing in the Treasury Department, all accounts relating to receipts from customs, including accounts of collectors and other officers of the customs, all accounts accruing on account of salaries in the Patent Office, all accounts of the judges, marshals, clerks, and other officers of all the courts of the United States, all accounts of the officer in charge of the public buildings and grounds in the District of Columbia, all accounts of the expenditures of the Department of Agriculture, all accounts relating to prisoners convicted in any court of the United States, and, after examining them, certifies the accounts of customs and of collectors and other officers of the customs to the Commissioner of Customs for his decision thereon; and the balances of all other accounts to the First Comptroller for his decision thereon.

In like manner the Second Auditor receives and examines accounts relating to the pay and clothing of the Army, subsistence of officers, bounties and premiums, military and hospital stores, and contingent expenses of the War Department, and accounts relating to Indian affairs, and of agents of lead and other mines, and certifies the balances to the Second Comptroller for his decision thereon.

The Third Auditor examines accounts relative to the subsistence of the Army, the Quartermaster's Department, and, generally, all accounts of the War Department other than those provided for, certain other Army accounts, and Army pension accounts, and certifies them to the Second Comptroller for his decision thereon.

The Fourth Auditor examines all accounts accruing in the Navy Department or relative thereto, and to Navy pensions, and certifies the balances to the Second Comptroller for his decision thereon.

The Fifth Auditor examines all accounts accruing in or relative to the Department of State (which includes foreign intercourse), all internal-revenue accounts, and accounts of the contingent expenses of the Patent

Office, and relating to the census, and certifies them to the First Comptroller for his decision thereon.

The Sixth Auditor examines accounts accruing in the Post-Office Department, relative to mail and postal service (not including salaries and expenses in the Department), and audits and settles the same, and certifies the balances thereon to the Postmaster-General. Various other duties are performed by this Auditor. He countersigns warrants drawn on the Treasury by the Postmaster-General, and is the register of the accounts which he settles.

The Postmaster-General, or any party dissatisfied with the settlement of an account by him, may, within twelve months, appeal to the First Comptroller, whose decision in such case is final.

The revenues and funds of the Post-Office Department go into the Treasury, but the accounts thereof are kept separate from those of the general Treasury, and these funds are appropriated separately, and only for the postal service.

The Second, Third, and Fourth Auditors keep and register the accounts audited by them, separate from those kept by the Register.

The decisions of the First and Second Comptrollers, and of the Commissioner of Customs, on accounts audited and certified to them, are final, subject to appeal to the courts or to Congress; and the settlement of an account by the Sixth Auditor is final unless an appeal be taken to the First Comptroller within twelve months.

The Comptroller of the Currency has control of the organization and the general supervision of the national banks, as also of the preparation and issue of circulation to them.

The Commissioner of Internal Revenue has the supervision of the internal-revenue assessments and collections, and the decision of various questions connected therewith.

The Light-House Board, of which the Secretary of the Treasury is ex-officio president, consists of two officers of the Navy, of high rank, two officers of the Corps of Engineers of the Army, and two civilians of high scientific attainments, whose services may be at the disposal of the President, together with an officer of the Navy and an officer of Engineers of the Army as secretaries.

The Coast Survey is in charge of a Superintendent, who has the assistance of officers of the Army and Navy detailed to that duty.

The Director of the Mint has the superintendence of the mint, branch mints, assay offices, and of assay and coinage of precious metals.

Under Presidential order of January 23, 1874, a Board on behalf of the Executive Department, of the Government was appointed by the President to represent the Government in its participation in the International Exhibition of 1876, and consisted of one member each from the Treasury, War, Navy, Interior, Post-Office, and Agricultural Departments, and one from the Smithsonian Institution.

On the Board Hon. Frederick A. Sawyer, Assistant Secretary of the

Treasury, represented that Department until his resignation during the month of June, 1874, by which his official connection with the Exhibition ceased. Subsequently, Mr. Robert W. Tayler, First Comptroller, was appointed to represent the Treasury as a member of the Board, and has continued in that position to the present time.

Very little was done by the Department toward representation at the Centennial Exhibition, until the latter part of April, 1876; but on an increase of the money appropriated, made in the act of May 1, 1876, work was pushed forward as rapidly as practicable; still the articles put in place for exhibition were incomplete at the opening of the 10th of May.

The sum appropriated for the Treasury was not sufficient to warrant as large an exhibition by that Department as would have been desirable; still the exposition was highly creditable to the Department and the Government, and, except in quantity and space, not inferior to that of any other Department. It was of objects wholly devoted to commerce and other peaceful pursuits; many of them to humane purposes.

The exhibitions on the part of the Treasury Department were made by the Light-House Board; the Superintendent of the Coast Survey; the Commissioner of Internal Revenue; the Director of the Mint; the Supervising Architect; the Bureau of Engraving and Printing; and the Superintendent of Life-Saving Service.

The catalogues of articles exhibited by these several branches of the Treasury Department are hereto appended, and will convey to the reader a general idea of the work performed by these branches, which come within the general scope of the Exhibition.

The historical sketches which accompany these catalogues were prepared by the respective offices.

LIGHT-HOUSE BOARD.

THE LIGHT-HOUSE BOARD.

Previous to 1851, the United States Government had no regularly organized Light-House Establishment. The aids to navigation then in use resulted from the necessities of commerce, and were in general charge of the Fifth Auditor of the Treasury. The establishment was far from complete, and did not satisfy navigators. Accordingly, by act approved March 3, 1851, Congress authorized and required the Secretary of the Treasury "to cause a Board to be convened" * * * whose duty it was made, "under the instructions of the Treasury Department, to inquire into the condition of the Light-House Establishment of the United States, and make a general detailed report and programme to guide legislation in extending and improving our present system of construction, illumination, inspection, and superintendence." This Board was "to be composed of two officers of the Navy, of high rank, two officers of Engineers of the Army, and such civil officers of high scientific attainments as may be under the orders or at the disposition of the Treasury Department, and a junior officer of the Navy to act as secretary to said Board."

The Board thus provided for was organized, and on January 30, 1852, submitted a report which was published as Senate Ex. Doc. No. 28, first session Thirty-second Congress. Based upon this report, Congress, by act approved August 31, 1852, provided for the organization of a permanent Light-House Board, to be composed of "two officers of the Navy of high rank, one officer of the Corps of Engineers of the Army, one officer of the Topographical Engineers of the Army, and two civilians of high scientific attainments whose services may be at the disposal of the President, and an officer of the Navy and an officer of Engineers of the Army as secretaries."

The Board so constituted is attached to the office of the Secretary of the Treasury, and, under his superintendence, discharges all the administrative duties of that office relating to the Light-House Establishment. The Secretary of the Treasury is ex-officio president of the Board, and the members from amongst their number choose one, by ballot, as chairman, who, in the absence of the president of the Board, presides over their meetings and is the executive head of the establishment.

Under the Board, the sea and lake coasts of the United States, and the western rivers, are at present divided into fourteen light-house districts, to each of which an officer of the Army or Navy is eligible for assignment as inspector, and the detail of such officers of Engineers of the Army as may be needed for duty in connection with the establishment is also authorized.

The law organizing the Light-House Board provides for quarterly meetings, but it is authorized to convene as often as the service requires. Practically the meetings are frequent. The current business is transacted by the chairman and the two secretaries, and questions outside of the routine are discussed and disposed of by the Board at its meetings.

Previous to 1776, and from that date down to August 15, 1789, the few lights and other aids to navigation that were in existence appear to have been sustained by the public authorities and by private citizens.

Since August 15, 1789, Congress has made provision for the establishment and support of all aids to navigation within the limits of the United States.

It does not appear, however, that this branch of the public service received the serious attention it demanded until July 1, 1820, at which date it was placed in charge of the Fifth Auditor of the Treasury, under whose special supervision it continued till the organization of the Light-House Board under the act of August 31, 1852.

On taking charge this officer found in operation 55 light-houses, and a few buoys in position.

In 1838 there were 210 light-houses and 28 light-vessels.

In 1850 the number of light-houses was 296; light-vessels 40, and buoys about 2,500.

The following tables show the condition of the Light-House Establishment on July 1, 1852, and July 4, 1876:

Number of lights, light vessels, and buoys in existence July 1, 1852.

Primary sea-coast lights	40
Secondary sea-coast lights	33
Sound, bay, and river lights	240
Light-ships or floating lights (tonnage ranging from 54 to 400)	40
Buoys in position (about)	2,500

Number of lights, light-vessels, and other aids to navigation in existence July 4, 1876.

Primary lights (5 double)		74
Secondary lights (69 on the lakes)		140
Sound, bay, and harbor lights (142 on the lakes)		317
River lights (Ohio, Mississippi, Missouri)		280
Light-vessels (10 double lights)		21
Total of light stations		832
Day beacons	358	
Buoys in position	2,902	
Fog-signals, steam, Daboll, and horns	62	
Fog-bells	84	
		3,406
Total aids to navigation		4,238

The following table shows the kind of lights (reflectors or lenses) in use July 1, 1852:

Reflectors.																						
21-inch.		18-inch.		16-inch.		15-inch.		14-inch.		13-inch.		12-inch.		10-inch.		9-inch.		Without reflector.		Lenses.		
No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No of lamps.	No of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	No. of stations.	No. of lamps.	First order.	Second order.	Third order.
7	18	1	30	1	19	7	15	2	15	1	11	2	15	1	10	1	8	1	6	*2		
10	15	1	11	2	14	2	14	5	13	2	10	1	7	1	4			1	5			
10	14	1	9	2	13	2	12	1	12	1	9							1	3		†2	
3	13			1	12	4	11	12	11	2	8							45	1			
2	12			2	11	16	10	1	10	1	6											‡3
3	11			4	10	10	9	35	9													
5	10			4	9	6	8	27	8													
2	9			5	8	7	7	11	7													
				2	7	3	5	24	6													
				1 Rg.	6	2	4	13	5													
				3	5			6	4													
				2	2			4	3													
				2	1			2	2													
								9	1													

* One fixed and one revolving. † One fixed and one flashing. ‡ One on the lakes.

First and second order lenses were used in primary lights only. Among the primary lights there were four double lights, and among the secondary ones there were nine revolving and nine red and red-shaded lights. In one instance, the same tower had a double light.

Among the sound, bay, and river lights there were seventeen revolving and thirteen double lights; one station had three lights, and eight had double towers.

The light-vessels had, in all, forty-seven lamps, seven of them having double lights.

The following table shows the kind of lights (lenses, reflectors, or lanterns) in use July 4, 1876:

Kind.	Order.							Reflectors.		Lanterns.		
	First.	Second.	Third.	Third and a half.	Fourth.	Fifth.	Sixth.	21 inches.	16 inches.	Lens.	Ship.	Hand.
Primary	53	13	8		2							
Secondary on coast		6	20		37	7						
Secondary on lakes		2	20	7	32	6	2					
Sound, bay, and harbor		9	8	5	91	86	88	11		1	3	
Sound on lakes			1	1	30	27	62			2		4
River lights					2		5			280		
Pier-head lights						1	5					
Light-vessels, ten being double lights.									31			

The following table shows the color of the sea-coast, sound, and harbor and lake lights:

Kind.	Flashing white or red, &c.	Red or red-shaded.	Fixed white.	Green.
Primary	19	6	36	....
Secondary (coast)	6	11	41	....
Secondary (lakes)	7	7	43	....
Sound and harbor (coast)	11	41	218	1
Sound and harbor (lakes)	1	*37	91	8

* And 3 on vessels.

Among the sound and harbor stations there is one tower having two lights; one station having three towers and eight stations with double lights.

Among the lake stations there is one at which three hand lanterns are used for the purposes of illumination.

There are four fog-signal stations without lights.

The number of portable beacons in operation is twenty-two.

There are in process of construction or authorized to be built (July 4, 1876), eighteen harbor lights and beacons.

By the act ot March 3, 1859, the Light-House Board was authorized to erect, when practicable, at the localities occupied by light-vessels, light-houses upon pile foundations. Under the authority granted by this act, the number of light-vessels in position has been greatly reduced.

EXHIBITS OF THE LIGHT-HOUSE BOARD, AT THE INTERNATIONAL EXHIBITION, 1876.

Peculiar difficulties were encountered by the Light-House Board in preparing its exhibit. The funds allowed for the purpose were only sufficient to meet the necessary expenses of the transportation and arrangement of articles exhibited. Nothing could be allowed for the preparation of new models of existing works or for the purchase of any articles. Nothing was shown, therefore, but apparatus, articles taken from the stock on hand, and models which had been constructed for the actual use of the Board in designing new structures.

The Board directed the following-named officers to superintend the preparation, and display of its exhibit: Capt. John L. Davis, U. S. N., Bvt. Brig. Gen. W. F. Raynolds, U. S. A., Commander G. B. White, U. S. N., and Lieut. A. G. Paul, U. S. N.; the last of whom was placed in charge at the grounds.

A rectangular space 40 feet long by 30 wide was allowed to the Light-House Establishment inside the Government building between the section occupied by the Coast Survey on the one hand, and that occupied by the Supervising Architect and the Bureau of Engraving and Printing on the other. Two tables were made, 30 feet by 3 feet, covered with red oil-cloth, on which were placed the smaller articles and models. A space, 18 feet by 35 feet, was railed off in which were placed the lenses, lamps, instruments, and delicate models. On the side wall of the section hung a large map, showing the location of every light under the jurisdiction of the Light-House Board. On the rear wall of the section the pictures were arranged. The space outside the building consisted of a large platform on which was placed a light-house, fog-bell, and buoys of different classes. Alongside the platform was placed a house containing both the caloric and steam sirens.

The exhibit within the building was ready by the opening day. On July 1st the fog-horns were working, and on July 4 the light-house was lighted for the first time.

The steam siren was, at the request of the authorities used to give notice of the daily opening, and closing of the Exhibition.

The exhibition was classified as follows:

Lenticular apparatus.
Lamps.
Lamp-burners.
Wicks and chimneys.
Illuminating materials.
Cleaning materials, and implements.
Testing instruments.
Light-houses, and models.
Buoys.
Fog-signals.
Light-ships.
Maps, plans, and graphic representations.

LENTICULAR APPARATUS.

The apparatus employed in the light-houses of the United States is almost exclusively of the catadioptric or Fresnel system. They are divided into seven orders, according to their size and the intensities of their lights. They are also distinguished according to the appearances they present as follows: Fixed white; flashing white; fixed varied by white flashes; fixed red; flashing red; flashing red and white; fixed white varied by red and white flashes; fixed white varied by red flashes; fixed red varied by red flashes.

Lights of the first order, being visible at the greatest distance, are placed upon the headlands or points farthest to seaward. The smaller and colored lights are used in narrow seas, passages, rivers and channels, or to mark the entrance to a roadstead or port, and in less important places.

The exhibit of lenticular apparatus was as follows:

First-order lens, white, flashing every 10 *seconds.*—Illuminates, 360° of the horizon; lamp and attachments complete for lard oil.

Third-order lens, fixed white.—Illuminates 360° of the horizon; lamp and attachments complete for lard oil.

Fourth-order lens, white, flashing every 10 *seconds.*—Illuminates 360° of the horizon; lamp and attachments complete for mineral oil.

Fifth-order lens, fixed white.—Illuminates 300° of the horizon, with catadioptric reflector; lamps and attachments complete for mineral oil.

River or stake lights.—In use on the Western rivers. These lights are placed on stakes or posts about 10 feet high, which can be moved as the channel changes. One of these lights was fitted up as in service and placed near the light-house; the other was among the exhibit of lenses. These lights can be plainly seen from 6½ to 7 miles. The cost of posts is nominal, as they are cut where they are used. The cost of the entire outfit does not exceed $10, and the cost of oil and wick used in a lamp, per night, does not exceed 2 cents. Mineral oil is used, and from one-third to one-half pint is consumed each night. If properly trimmed, the light should burn 16 hours without retrimming. The lantern is so constructed that the wind cannot blow the light out nor even make it smoke. To secure this result each lantern is tested in front of a steam blower before it is accepted.

Range or leading lights.—These lights are used when it is necessary to keep in a channel, or mark where a channel changes its direction. Both lights must show in one vertical plane. If more than one set is used, the new range will mark the change in the channel, and before the old one is off the new one should be on.

Running lights.—For steamers at night, as used on board the United States light-house tenders and supply vessels.

Mast-head lights.—For the banks of a canal, showing the light up and down the canal.

Fourth-order lens.—Shows a red and white flash alternately every 10 seconds, illuminating 360° of the horizon. In use on the light-house outside of the Government building.

LAMPS.

Three kinds of lamps are in use, the mechanical, the moderator, and the hydraulic.

In the mechanical lamp the oil is forced into the burner by pumps driven by clock-work, run by a weight. In moderator lamps the ascent of the oil is effected by a weighted piston. Hydraulic lamps depend for their supply upon the pressure of the oil above, regulated by various devices.

A complete exhibit was made of the different lamps, of which the following is a list:

Wagner's mechanical lamp, 1855.—A reciprocating motion is given to two vertical shafts which pass through the oil cistern and work the feed pumps. A fly regulates the velocity. The flow of oil is regulated by turning a screw placed in the upper part of the oil case. The pumps communicate with the reservoir of oil by means of a feed-pipe fitted at its lowest extremity with a small strainer. The pistons are formed of plungers of calf-skin, and the valves are of the same leather.

Lepaute's mechanical lamp, 1855.—The mechanism in this case consists of a barrel carrying a crown-wheel, fitted on its two faces with friction rollers, which make an escapement with four bent levers. These levers work two shafts, which traverse the oil cistern and put the four feed-pumps in motion. The flow of oil is regulated by a small orifice in a diaphragm placed in the upper part of the pump case. A small pointed screw penetrates the orifice and the flow is regulated at will by turning the screw.

Moderator lamp, 1855.—A cast-iron piston, bound with leather, and of such a size as to gently slide in the lamp-cistern is connected above with a horizontal shaft by a chain which winds around the shaft. On the piston are weights to make it descend. By turning the shaft the chain is wound up and the piston ascends; then left alone it causes by its pressure a flow of oil to the burner. The regulator is a small orifice through which the oil is forced and a needle is pushed in or withdrawn to diminish or increase the supply. This device is usually arranged so as to be self-acting.

Coate's valve lamp, 1856, *fourth order.*—The reservoir of the lamp is a hollow cylinder and is placed above the lens, on the framework of which it rests. The flow of oil is regulated by an automatic valve to the axis of which a stem is attached bearing at one extremity a counterpoise and at the other a cup into which the surplus oil from the burner drips. This cup is pierced with a little hole, and when full of oil sustains its counterpoise; but if the oil ceases to flow, the counterpoise falls and opens the valve.

Meade's lamp, 1857, *third order.*—This also has a reservoir in the dome of the lantern. By means of a screw-pin on the supply tube, the tube can be closed or opened at will, thus regulating the delivery of the oil.

Funck's hydraulic float lamp, 1876, *first order.*—The reservoir is placed as in the two preceding lamps, above the apparatus. The flow is regulated by a small float carrying a valve, and contained in a close chamber. When the supply is too copious, the float rises and the valve stops the orifice of the supply tube. As the oil in the chamber is consumed the float falls and allows a freer flow of oil. The relative distance of the valve from the float is regulated by means of a thread cut on the valve stem. The lamp is in general use in the light-houses of the United States.

Funck's hydraulic float lamp, second order.—Its action is the same as that of the last-mentioned lamp, but it has a glass float chamber showing the float and the action of the float. One of these lamps fitted for service was also exhibited.

Third order Funck's hydraulic float lamp.

Fourth order float lamp for mineral oil.

Fifth order lamp for mineral oil.

Fountain lamp, 1853.—An argand or constant level lamp, composed of two parts, the burner and the reservoir or fountain. The reservoir is provided at its lowest part with a valve, which lifts when the stem which is attached to it comes in contact with the bottom of the body of the lamp. A communication is thus established between the reservoir and the burner.

Common regulation hand lantern for tower use.

Lantern with lucerns.—For lighting the main lamp at night, as matches are not allowed in the light-house tower.

Rod lamp.—This lamp is constructed on the same principle as the student's lamp. It is to be kept ready for use in case of accident to the main light, when but a few seconds can elapse before it is replaced by the rod lamp, which should be near the keeper on watch. It is also used while the main light is being trimmed.

Hanging lamp.—For use in the cabins of the light-house tenders and supply vessels. Its action is the same as that of Funck's hydraulic float lamp described above.

LAMP BURNERS.

The burner of a lamp is the case in which the wicks are set and lighted. Lamp-burners are provided with from one to five concentric wicks, according to the order of the light and the intensity required. The lower end of each wick is fixed to a circular carrier and raised and lowered by means of a rack. A pipe forming the stem of the burner supplies the wicks with oil.

First-order lamp burner, with a photograph of the flame of natural size.

Second-order burner, with the same.

Third-order burner, with the same.

Fourth-order burner, with the same.

Fifth and sixth order burner, with the same.

WICKS AND CHIMNEYS.

Samples of wicks used in all the different orders of lamps were exhibited, also a case containing the different varieties of chimneys used in the Light-House Establishment.

ILLUMINATING MATERIALS.

The oil in use in the Light-House Establishment is winter-strained lard oil, which must be of such a quality that when burning in a fifth-order Franklin lamp it will give the intensity of nine candles. Samples of this oil, contained in the regulation oil-butts, were exhibited; also samples of mineral oil used in many small lights, and of signal oil, which remains fluid in any temperature.

CLEANING MATERIALS AND IMPLEMENTS.

Oil-pump.—Used to transfer oil from casks to the butts and from these to oil-carriers.

Oil-strainer.—This is in two parts, the strainer proper, and the vessel to receive the strained oil. The strainer proper is a plate pierced with holes. On it is placed a piece of cloth and a thin layer of fine sand.

Oil buckets and cans.—These are used to carry oil inside the light-house.

Measures.—These are used in determining the quantity of oil consumed in the lamps.

Service-box fitted for use.—This has a transverse handle and a cover with two lids. It is divided into three compartments. The first receives a flat tray, on which are temporarily placed greasy cloths and wick trimmings; under this tray are the clean cloths for wiping glass chimneys. The second compartment contains a triangular scraper for removing crusts of burned oil from the burner, a horse-hair brush for cleaning the lamp and tubes of the burner, and a pair of curved scissors for trimming the wicks. The third compartment contains a pair of straight scissors for cutting wicks, a measure to determine the proper lengths, and the conical mandrels for fitting the wicks on to the tubes.

Dripping-pan.—A square, flat vessel with a double bottom, the upper one pierced with holes.

Lamp-filler.—For filling small lamps and lanterns.

Rouge box.—Containing polishing rouge (peroxide of iron) for polishing the glass of the lenticular apparatus and lantern.

Whiting-box.—Containing Spanish white for polishing glass and tin, and for making putty.

Lifters.—For removing chimneys from lighted lamps.

Small spirit-level.—Used to verify the level of the crown of the lamp-burner.

Large spirit level.—Used to verify the position of the surface on which the rollers of the revolving apparatus move.

Heater for mechanical lamps.—A little lamp shut in an oblong box with two tubes.

Molds.—For making plunger and valve leathers for mechanical lamps.

Punch.—For cutting valves of lamps, and washers for joints.

Key.—For winding revolving machinery.

Wolf's-head brush.—A long handled, round horse-hair brush, used for cleaning ceilings and staircases.

Long-handled brushes.—Of horse-hair, used for sweeping rooms and stairways of the interior of light-houses.

Feather-dusters.—For dusting apparatus and glass of lanterns.

Counter-brushes.—A short handled brush with long bristles for sweeping the service-table, gallery, and steps.

Silver-plating brushes.—Used to clean the lamp, clockwork, and utensils.

Sash-brushes.—Used to paint the iron work of the lanterns and illuminating apparatus.

Bottle brushes.—Used to clean the burners and chimneys.

Wick-boxes.—For preservation of wicks of various sizes.

Oil-gauge.—For measuring height of oil in butts.

TESTING INSTRUMENTS.

Photometer, used for measuring the intensity of light. This is a modification of Bunsen's instrument. The intensity of a light is obtained by comparing it with a light of a known standard, which in the United States Light-House service is a London sperm candle burning about 2 grains of its substance per minute. For lights of great intensity the candle is first compared with a larger light, and then this latter with the light to be tested. This instrument consists of a graduated scale, at the two extremities of which are placed the lights to be compared. The graduation of this scale is made according to the formula based upon the law that the intensity of a light varies inversely as the square of the distance at which it is seen. Upon the scale slides a small white screen, placed vertically between the two lights. In the center of this screen a circular hole about half an inch in diameter is closed by a piece of thin paper rendered translucent by a solution of spermaceti in oil of turpentine. The screen is so placed between two mirrors, that a reflection of the two sides can be seen at the same moment and compared. To test the lights, the screen is moved to a position between them where the two images on the screen are exactly of the same brightness. An index gives the reading of the scale at this point, and this shows the intensity of one light in terms of the other.

All oil used by the light-house establishment is subjected to a careful test before purchase. The experiments are made in a dark room, the ceilings, walls, and floors of which are painted dead black.

An artificial ear, designed by the chairman of the Light-House Board, consisting of a large trumpet-shaped instrument with a membrane stretched tightly over the smaller end, which is covered with a glass shade having a magnifying glass in its upper portion. Sand is placed on this membrane, and when two sounds are to be compared, the agitation of the sand, when the large end is towards the direction from which the sound comes, is noted in each case. The arrangement of the particles of sand is also noted to find the nodal points of the sound. This instrument is intended to merely concentrate the rays of sound and not to act as a resounding cavity. The distance when measured in feet or yards gives the number indicating the penetrating power of the sound under trial.

LIGHT-HOUSES AND MODELS.

Model of caisson and coffer-dam—Used in building the foundation for Spectacle Reef light-house, Straits of Mackinac.

Model of Spectacle Reef Light-house.—This light-house stands upon a reef in the northern end of Lake Huron, off the eastern end of the Straits of Mackinac. It is built upon the southern end of the most northerly of two shoals of limestone, paved with a covering of bowlders 2 feet thick. The least water in the shoals is about 7 feet; but at the site selected for the light-house the rock is 11 feet under water. The nearest land 10½ miles distant is the southeasterly point of Bois Blanc Island; a depot was made for building materials at Scammon's Harbor, about 16 miles from the light-house site. The greatest exposure to waves is to the southeastward, from which direction the seas have a fetch of about 170 miles.

Were there no other elements of destruction, no unusual precautions would have been necessary to secure sufficient stability. But under certain meteorological conditions currents having a velocity of from 2 to 3 miles per hour are developed here, and during the inclement season serve to move to and from ice-fields 2 feet thick, which frequently have an area of thousands of acres. This fresh-water ice is of great solidity, and, when moving in masses, and with the velocity named, has a force almost irresistible. The aim was to oppose to it a structure against which the ice would be at first crushed, and then so impeded in motion as to cause it to ground upon the shoal itself, thus forming a barrier against subsequent action. In the spring of 1875 the ice was piled up against the light-house 30 feet above the water, or 7 feet above the sill of the doorway, which is 23 feet above the lake. When the keepers went to the station to exhibit the light (not in operation during the winter) they were unable to obtain entrance to the tower until they had cut a passage through this pile of ice to the doorway. The tower is built of light-gray limestone, and is 97 feet from base to focal plane. The illuminating apparatus is of the second order, showing alternate red and white flashes at intervals of thirty seconds, visible 17 miles. The fog-signal is a 10-inch steam whistle.

Model of Brandywine Shoal light-house on Brandywine Shoal, Delaware Bay.—This light-house is erected on iron screw piles, with an iron screw pile ice-breaker. The illuminating apparatus is 46 feet above sea-level, and is of the third order, showing a fixed white light visible 12 miles. The fog-signal is a bell struck by machinery.

Model of Coffin's Patches light-house.—An iron pile structure on the Florida Reefs, with a first order illuminating apparatus visible 19 miles.

Model of Sand Key light-house.—The original is on a small sand and shell island in the Florida Reefs, and is 7¼ nautical miles from Key West, Fla. It is an iron pile light-house 121 feet from base to focal plane, with a first order illuminating apparatus showing a clear light for one minute followed by a brilliant flash of ten seconds, preceded and followed by partial eclipses of twenty-five seconds' duration.

Model of light-house at Chicago, Ill.—The light-house is an iron tower on the north pier of Chicago Harbor, Lake Michigan. It is 83 feet above the lake level, and has an illuminating apparatus, fixed white, of the third order, visible 16 miles.

Minots Ledge light-house.—On the outer Minots, Boston Bay, an exceedingly exposed and dangerous situation. The tower is built of dark-gray granite, 100 feet from base to focal plane, and 92 feet above the sea-level. It has a second order fixed white illuminating apparatus, and is visible 16 miles. The fog-signal is a bell struck by machinery. The original tower (an open-work iron structure) was destroyed about twenty-five years ago.

Model of the crib work for the foundation of Southwest Pass light-house, mouth of the Mississippi River.—This is built on a low marshy island west of the pass. In the construction of this model, the two upper courses of grillage and plank floor were omitted. The model is made from a log which it is known had been sunk in Lake Pontchartrain for more than 50 years.

Complete light-house, fitted up, with light-keepers in charge.—This light-house, in which a keeper lived during the exhibition, has a fourth-order lens, flashing red and white alternately, and was lighted every evening during the exhibition. This iron structure is to be permanently placed on the caisson on Ship John Shoal, Delaware River, at the close of the exhibition.

BUOYS (OUTSIDE OF THE BUILDING).

First-class iron can buoy.
First-class iron nun buoy.
First-class iron spar buoy.
First class iron spar buoy.
Second-class iron can buoy.
Second-class iron nun buoy.
Second-class iron spar buoy.
Second-class iron spar buoy.
Third-class iron can buoy.
Third-class iron nun buoy.

All these buoys had attached ballast balls, chains, sinkers, &c., complete for service, and were so painted as to show the different marks and colors used in the buoy service.

INSIDE OF BUILDING.

Models of spar buoys in use.
Models of iron spar buoys (experimental.)

The following description table was also shown in connection with the buoys:

Class.	Buoys.				Chains.					Sinkers.	Ballast balls.
	Kind.	Weight.	Diameter.	Length.	Size.	Length between shackles.	Size of iron in shackles.	Weight of shackles.	Weight of chain.	Weight.	Weight.
		Lbs.	*Ft. In.*	*Ft. In.*	*In.*		*In.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*
First class	Can.....	3,325	6 0	9 6	1½	7½	2	120	990	3,220	1,130
First class	Nun....	3,100	6 4½	12 0	1½	7½	2	120	990	3,220	1,130
Second class..........	Can.....	1,690	4 4	7 0	1¼	7½	1½	66	685	1,810	386
Second class..........	Nun	1,300	4 0	6 6	1¼	7½	1½	66	685	1,810	185
Third class..........	Can ..	530	.....	....	1	7½	1¼	39	452	1,162	110
Third class..........	Nun	450	......	......	1	7½	1¼	39	452	1,162	110

LIGHT-SHIP.

Complete model of light-ship No. 40.—This model is rigged to represent a light-ship ready for service on her station, on a scale of three-quarters of an inch to the foot. Its timbers, planks, &c., are on exact scale, and each one is placed in position separately and is drawn off on board as in the mold loft.

Lantern for the mast-head of a light-ship with lamps and reflectors.

Day-mark for the mast-head of a light-ship.

Mushroom anchor for a light-ship weighing 4,200 pounds.

BOOKS, MAPS, PLANS, AND GRAPHIC REPRESENTATIONS.

The drawings and paintings are as follows:

Currituck Beach light-house, North Carolina.
Saint Augustine light-house, Florida.
Race Rock light-house, Long Island Sound.
Cleveland, Ohio, light-house, Lake Erie.
Piedras Blancas light-house, California.
Ship John Shoal light-house, Delaware River.
Hunting Island light-house, South Carolina.
Thimble Shoal light-house, Hampton Roads, Virginia.
First Class light-vessel, with steam fog-signal.
Screw-Pile River and Harbor light-house.
Sand Key light-house, Florida.
Alligator Reef light-house, Florida.
Pigeon Point light-house, California.
Craighill Channel light-house (front), Chesapeake Bay.
Craighill Channel light-house, (rear), Chesapeake Bay.
Fort Sumter light-house, South Carolina.
Light-house tender.

Grosse Point light-house, Lake Michigan.
Fowey Rocks light-house, Florida.
Day-beacon, sea, Flower Reef, Long Island Sound.
Minots Ledge light house.
Penfield Reef light-house, Long Island Sound.
Spectacle Reef light-house, Lake Huron.
Foundation for Cross Ledge light-house, Delaware Bay.
Tybee Island light-house, South Carolina.
Old Field Point light-house Long Island Sound.
Fowey Rocks light-house, Florida.

A large map 17 feet by 19 feet.—This shows the location of each light under the jurisdiction of the Light-House Board. Each class is distinguished on the chart by the size of the red circular spot denoting order and its range of visibility.

The following table shows the number of the lights shown on the chart, and their respective orders:

First-order lights	46
Second-order lights	28
Third-order lights	67
Fourth-order lights	190
Fifth-order lights	125
Sixth-order lights	179
Stake lights	280
Reflectors on light-ships	38
	953

The Light-House Board's Reports for 1873, 1874, and 1875, also light-house lists, buoy lists, and special reports, were issued, on request, to persons interested in light-house matters. A set of portfolios and books were also exhibited, showing specifications, plans, and designs for the following lights:

Calcasieu, Louisiana.
Cleveland, Ohio.
Day-beacons for Potomac River.
West Point, New York.
Keeper's dwelling for first-order steam fog-whistle.
Oil butts.
Iron bell-boat.
Fourth-order harbor light and keeper's dwellings.
Hudson City, New York.
Hunting Island, South Carolina.
Thirty mile Point, Lake Ontario.
Block Island, Rhode Island.
Thimble Shoal, Virginia.
Penfield Reef, Long Island Sound.
Craighill Channel, Iron Beacon.
Buoys, sinkers, &c.
Fowey Rocks, Florida.
Southwest Ledge, Long Island Sound.
Thomas Point Shoal, Chesapeake.
Timbalier, Louisiana.
Body's Island, North Carolina.

FOG SIGNALS.

Fog-bell struck by a large hammer worked by clock-work.—It gives one, two, one, three strokes at regular intervals. The clock-work was designed by Mr. J. M. Stevens, of Boston, by whom it was placed at the Exhibition.

Steam siren.—The general character of the instrument may be described as follows: Suppose a drum of short axis, into one head of which is inserted a steam-pipe connected with a locomotive boiler, while the other end is provided with triangular orifices through which the steam is at brief intervals allowed to enter. Immediately before this head, and in close contact with it, is a disk provided with corresponding radial slits. This disk revolves 2,000 times a minute. By this arrangement at every complete revolution of the disk the orifices in the head of the drum are opened and shut with great rapidity, thus producing a series of rapid impulses of steam. This steam issues through the smaller orifice of a trumpet immediately in front of the revolving disk. The impulses are of such intensity and rapidity as to produce a sound of great magnitude and penetrating power. The siren is attached to a horizontal cylindrical tubular (locomotive) boiler, with a pressure of from 50 to 150 pounds on the square inch. A small engine is attached for feeding it and for rotating the disk, the latter being effected by means of a band passing over pulleys of suitable relative dimensions. The machine as exhibited was complete in all its parts as adapted for steam, cold or hot air, or other gases under pressure.

Siren blown by compressed air.—A 12-horse power engine operates this siren. At one time when fires were not even lighted on this caloric engine, orders were given, and in seven minutes the fog-horn was blowing its regular blasts at intervals.

Courtenay's automatic signal-buoy.—A model of this was exhibited in September. It consists of a large can, a shell, to which a tube 32 or more feet in length is attached. This tube passes through the buoy, and is furnished with a diaphragm through which pass three smaller tubes. One of these tubes is open at both ends, the upper end being so placed that any air passing through it will act upon the whistle placed upon the top of the buoy. The other tubes are open at the top, and at the bottom are fitted with ball valves, which allow air to pass down, but prevent it from passing up. If now the buoy should remain stationary and the level of the water rise and fall around it, the following would be its action: As the water fell in the large tube, air would rush in through the smaller tubes, the valves being arranged to allow this. As the water rose again the air between the diaphragm and the water level would be compressed, and as the valves closed the only exit would be the tube connected with the whistle. It will thus be seen that the action of the apparatus itself is of the simplest character. These buoys may be moored in a sufficient depth of water. Each buoy is provided with a sort of wing or rudder, which keeps it in proper position.

COAST SURVEY.

UNITED STATES COAST SURVEY.

At the beginning of the present century extensive geodetic surveys were going on in different parts of Europe, undertaken as well for their indirect as for their direct results, and geodesy was rapidly assuming a scientific and practical form. The example was not unheeded by the United States. The requirements of commerce pointed to a survey of the coast as the measure of immediate importance, and through the intelligence and influence of its distinguished advocates the work at the very outset was organized upon the most approved methods known to geodetic science.

Toward the close of 1805 Ferdinand R. Hassler, a native of Switzerland, arrived in the United States in search of a permanent home. He had been employed in the triangulation of the canton of Berne, and his valuable experience, combined with high scientific attainments, early attracted the attention and won the consideration of those who, fortunately, were scientists themselves, and at the same time prompt to take up any plan that would advance the interests and credit of the country. Among these Dr. Robert Patterson, president of the American Philosophical Society, and Albert Gallatin, then Secretary of the Treasury, stood pre-eminent. The law authorizing the survey of the coast was passed February 10, 1807, upon the recommendation of Thomas Jefferson, then President of the United States, and the plan adopted for its execution was the one proposed and previously foreshadowed by Mr. Hassler.

In 1811 Mr. Hassler proceeded to England to have the necessary instruments made according to designs prepared by him; was detained there during the war with Great Britain; returned in 1815; and in August, 1816, was formally appointed Superintendent of the Survey. Operations were at once commenced on a limited scale, and were vigorously prosecuted until April, 1818. For a considerable period after that date appropriations ceased, but public conviction in regard to the utility of the work permanently deepened during the suspension of the survey. In July, 1832, Congress, at the repeated solicitation of the Hon. Samuel L. Southard, Secretary of the Navy, and of others interested in the development of the coast and harbors, revived the act of 1807, and Mr. Hassler was reinstated as Superintendent. From 1832 to 1836, the survey was under the control of the Navy Department. In the latter year the charge was reassigned to the Treasury Department, and so remains.

Again, in 1843, and for the last time, the survey was the subject of legislative action. On the 3d of March of that year a Board was appointed by Congress, with authority to reorganize the mode of executing the survey. The plan agreed upon by the Board and approved by the President reaffirmed the scientific methods adopted by Mr. Hassler, and defined with considerable detail the organization and order required to carry them out, and these prime features, confirmed by subsequent experience, are yet retained, except so far as they have been extended and improved by commercial or other public requirements.

Since the survey was first authorized, the seaboard of the United States has been more than quadrupled in extent by the acquisition of Florida and Texas, and of California, Oregon, and Alaska. It now stretches through 21° of latitude and 14° of longitude on the Atlantic; 5½° of latitude and 16° of longitude on the Gulf of Mexico; and on the Pacific, exclusive of Alaska, through 16½° of latitude and 7° of longitude.

SUPERINTENDENTS UNITED STATES COAST SURVEY.

Ferdinand R. Hassler, August, 1816, to April, 1818.
Ferdinand R. Hassler, August, 1832, to November, 1843.
Alexander D. Bache, December, 1843, to February, 1867.
Benjamin Peirce, February 26, 1867, to February, 17, 1874.
Carlile P. Patterson, February 17, 1874.

Professor Hassler died November 20, 1843; Professor Bache, February 17, 1867, and Professor Peirce resigned February 17, 1874.

The survey may be said to have commenced in 1832, and between that date and the close of 1843 the Fire Island base had been measured; a network of triangles, primary and secondary, had been extended over the coast from Point Judith to Cape Henlopen and the Chesapeake, and the topography and hydrography had made commendable advance within the same limits.

It was not, however, until 1844 that the magnitude and responsibilities of the work were fully realized. In the year following the Atlantic and Gulf coasts were divided into sections, in each of which the different operations of the survey were carried on simultaneously. By this division of the field, commerce and the interest of each part of the seaboard experienced the benefits of the survey at the earliest moment. A similar system was carried out on the Pacific coast upon the acquisition of California in 1849. Step by step the organization was perfected; a more thorough system was introduced in the conduct of the field and office operations; a higher standard was established for the topographical surveys; a wider field opened to hydrographic research; and the supervision of the Superintendent was extended to every detail. While "the Coast Survey owes its present form and perhaps its existence to the zeal and scientific ability of the first Superintendent," the organization as it exists to-day, complete in every branch, is the creation of Alexander D. Bache. To his untiring energy, administrative qualities, and varied scientific attainments, the progress, value, and high character of the survey may be justly ascribed.

The survey being under the charge of the Secretary of the Treasury, the regulations for carrying out the organic law and all decisions in cases affecting the survey or its personnel, are made by him, in consultation with the Superintendent. The Secretary is also the medium of official correspondence with the other Departments and with Congress.

Estimates in detail for the different expenses to be incurred in the prosecution of the work are annually submitted by the Superintendent for the approval of the Secretary, and by him included in the Treasury budget for the next fiscal year. Upon those estimates all appropriations for the survey are specifically made by Congress.

The staff of the survey is composed of the Superintendent and of assistants and subassistants, consisting, by law, of civilians, Army and Navy officers. A previous experience, obtained by years of service in a subordinate capacity, is an indispensable requisite, in conjunction with other qualifications, for an appointment as a civil assistant. After that promotion depends altogether upon efficiency, regardless of seniority or influence.

The Superintendent is the immediate head of the survey. He lays out the work to be executed during the season throughout the country; he assigns to each assistant an appropriate duty under written instructions, a definite field of labor, and a limited credit with the disbursing agent; he takes general supervision over all the operations of the office, as well as over the construction and comparison of the standard weights and measures; he inspects the parties in the field whenever practicable; and at the close of the year when the reports of the different parties are received, he carefully examines the results accomplished by each assistant, and from these and the office reports the annual report is compiled. Besides these administrative duties, the discussion of scientific questions connected with the various operations of the survey, and all special investigations and experiments required for additional data, are conducted under his direction, while, at the same time, he co-operates with other bureaus of the Government, in matters in which the special information and resources at his control would benefit the public service.

The details of the scientific methods employed are fully explained in the annual reports, and in the Professional Papers published under the authority of the survey. It is only necessary here to give the general order of the field operations: Reconnaissance, measurement of bases, triangulation, primary, secondary, and tertiary; astronomical observations for time, azimuth, and latitude; telegraphic determination of longitude; topography, determination of the magnetic elements and hydrography, in shore and off, including the exploration of the Gulf Stream, the investigation of tides and of other questions of value to the navigator and to science.

The results of these extensive field operations are regularly forwarded to the office at Washington, and are there revised, combined, and reduced, and find their way to the public in the form of four classes of charts: Sailing charts, general coast charts, coast charts, and harbor charts.

Beside these direct results—and among these should be included the data for studying the various problems of defense, river and harbor improvements, light-houses, and other national and local objects depending on the topography of the immediate line of the coast, peculiarities of the tides and variation of the magnetic needle along the coast, with researches for the law of variation over the entire continent—the survey has made valuable additions to geodetic science, and by the measurement of arcs of meridian and parallel, completed and in progress, will contribute the proportion of data, due from America to Europe, for determining the dimensions and figure of the earth.

In 1872, upon the recommendation of the Superintendent Benjamin Peirce, Congress directed that the Coast Survey should make a geodetic connection between the Atlantic and Pacific coasts, and also ordered that it should supply triangulation points to any State which would provide for its own topographical and geological survey. The advantages to the General Government of an accurate map of a State are quite as great as to the State itself, and co-operation in its construction was considered, for this and other reasons, an almost imperative duty. The policy of Congress in supplying the frame-work of the survey, consisting of a net-work of triangles secured by measured bases, and the usual astronomical determinations, insures to a certain extent its accuracy; and that, eventually, when the different network shall be connected with each other and with the triangulation of the coast, they will together constitute one harmonious whole based on the same scientific methods and standard of execution.

CATALOGUE OF INSTRUMENTS, ETC., EXHIBITED BY UNITED STATES COAST SURVEY.

The exhibition on the part of the survey of the coast includes characteristic specimens of the instruments and apparatus employed in the triangulation, astronomical, surveying, and hydrographical operations of the survey, with a view to illustrate the order, character, and precision of the field-work; secondly, the results of the field operations, and of the intermediate processes as embodied in 300 charts and preliminary sketches of the Atlantic, Gulf, and Pacific coasts of the United States, published for the benefit of commerce and navigation; and finally the annual reports, and other publications, in which the methods adopted in the field and in the office are discussed and published for the advancement of science.

With but few exceptions no instrument or apparatus will be exhibited or method referred to which is not, in whole or in part, of American construction or origin.

STANDARD WEIGHTS AND MEASURES OF THE UNITED STATES.

In correlation with the commercial objects of the survey, and of the standard character of the measurements to be made during its execution, the construction of the standard weights and measures is under charge of the Superintendent of the survey. These standards will be represented by a complete set of the measures of length and capacity and of the different established weights, both of the American and metric systems, and by the comparators and balances used in their construction.

GEODESY.

1. *Compensation base apparatus*, 6 meters in length; composed of two bars, one of brass and the other of iron, firmly connected at one end and free at the other. The free ends are connected by a lever so related to the different expansions as to preserve one point at an invariable distance from the fixed end. The specialties of the apparatus consist in the relative proportion of the cross-sections of the two bars, so that their acquired temperature will be equal during changes; in the delicate knife-edge lever of compensation attached to the free ends, and, at the fixed end, in the level contact so adapted as to admit of its use on inclined grades.

The apparatus was designed in 1845 by A. D. Bache, superintendent, and constructed in 1846 by William Wurdeman, mechanician of the survey, to whom many of the details are due. The equipment for the field includes a 6-meter standard bar arranged for comparison with the base bars, and a Saxton pyrometer mirror-comparator for indicating minute differences of length. These comparisons are made before and after the base measurement.

For a full description of the apparatus, its theory, practical working, and results, see Appendices 21 and 12, Reports for 1865 and 1873.

2. *Models* of the usual form of signal and of two or three varieties of the braced tripod and outside scaffold on which the instrument and observer are mounted to obtain elevation. Their height varies from 15 to 60 feet.

3. *Heliotropes* or signals for the longer lines of the triangulation, constructed on different plans, looking to certainty of direction, simplicity of adjustment, and economy in their cost.

4. *Theodolite* for primary triangulation; graduated circle 20 inches in diameter, with three micrometer microscopes reading to parts of a second by radial illumination; focal length of telescope 42 inches, and diameter of aperture 3 inches.

Constructed for the Coast Survey by William Wurdeman.

5. *Theodolite*, repeating, for secondary triangulation; graduated circle, 12 inches in diameter, reading to three seconds by means of verniers and microscopes. Circle by Gambey, of Paris; upper parts, including telescope of 26 inches focal length and 2¼ inches aperture. Made at Coast Survey Office.

6. *Theodolite*, repeating, for tertiary triangulation, diameter of circle, 10 inches. Made by C. Fauth, of Washington.

7. *Vertical circle*, repeating, for measuring double zenith distances; circle by Gambey, 12 inches in diameter, with four microscopes and verniers reading to three seconds. Movements reconstructed at Coast Survey Office.

8. *Zenith telescope;* focal length, 48 inches; diameter of aperture, 3½ inches; constructed at Washington by William Wurdeman, and used for determining the latitude of a station by measuring the difference in the meridional zenith distance of two stars of about the same altitude and culminating at nearly the same time, one north and the other south of the zenith. The distinctive features of the instrument are the filar-micrometer eye-piece and delicate spirit level, and of the method, its simplicity and freedom from errors of refraction and personal equation. (For details see Appendix 10, Report for 1866.)

The above method of employing the zenith telescope originated with Capt. Andrew Talcott, United States Engineer Corps, in 1834. The instrument was introduced in the survey in 1846, and having received several improvements suggested by experience, it has been exclusively employed in the field-work since 1851.

9. *Transit and equal-altitude instrument*, or a combination of the zenith telescope and portable astronomical transit, by adding to the latter a filar-micrometer eye-piece and delicate level, and by dividing the iron horizontal frame into two parts, so that the upper part, carrying the entire instrument, can be revolved 180° or more in azimuth, without disturbing the level or interfering with its relation to the telescope. (See Appendix 8, Report for 1867.)

The combination was first suggested by Assistant George Davidson in 1853, but it was not until 1868 that the instrument, as exhibited and now used in the survey, was perfected and constructed at the office.

10. *Astronomical transit*, with reversing apparatus; focal length of telescope 46 inches, and diameter of aperture, 2¾ inches; twenty-five threads divided into five groups, together with battery, a Bond astronomical clock, or chronometer, with break-circuit attachment, chronograph, keys for tapping, and the usual equipment for determining differences of longitude by the electric telegraph method, purely American. (For details see reports and scientific papers of the Survey and Astronomische Nachrichten, Nos. 632 and 666.) The theory and details of the method were elaborated by Assistant Sears C. Walker in 1845, were practically carried out in 1846, and by means of the circuit-breaker and revolving-cylinder chronograph designed by Joseph Saxton, United

States Coast Survey, were brought to their present degree of perfection in 1849.

11. *Personal error apparatus*, portable, to enable the assistant on telegraph longitude duty to determine the error he may have committed, if any, in noting the time of the star transits, in consequence of some personal peculiarity, temporary or permanent.

The clock-breaks and apparatus-breaks are in one electric circuit, the registration being automatic, while the breaks for the apparent transit by the observer are effected through a second circuit, the true and observed time being thus recorded on the same chronograph sheet, side by side.

12. *Personal equation apparatus*, portable, constructed on the same general plan as the preceding. The improvements consist in the delicate arrangements for adjusting the electric-break to the bisection of the star by each of the five threads, and in the addition of a telescope of minor power to aid in making an accurate adjustment of the apparatus-breaks.

The five lines and the image of the artificial star appear upon the same surface; there is, therefore, no parallax; hence two or more observers can obtain their personal equation by observing at the same time through small telescopes or field-glasses at a suitable distance. (For description of details see Appendix, Report for 1875.)

Designed and constructed by Werner Suess, mechanician, United States Coast Survey.

13. *Mercurial horizon*, designed by J. H. Lane, Coast Survey Office, to extinguish ripples or oscillation, in the mercury.

SURVEYING.

14. *Plane-table*, with alidade, magnetic declination needle and telemeter, as improved from time to time in its adjustments, stability, and usefulness; constructed at the office and used in the survey for topographical details. (See Appendix 22, Report for 1865.)

15. *Gradienter.*

16. *Magnetic apparatus* for determining the declination, dip, and intensity of the magnetic force. Magnetometer No. 7 is for observing work requiring precision and facility for observing large disturbances, and is of the construction which, in deflection, keeps the magnets at right angles to each other; a simple contrivance has been added for determining the induction co-efficient. For ordinary field-work the survey uses the theodolite separate from the box containing the magnet, although both are mounted on the same stand. In this case the deflecting magnet remains in the plane of the magnetic prime-vertical. The principle of collimation is employed in both forms.

17. *Dip circle No.* 10, of the ordinary pattern, with the single improvement that the needles have movable axles, admitting of different positions to eliminate the defects in the shape of the pivots. (See Appendix No. 14, 1872.) Made at Washington by William Wurdeman.

HYDROGRAPHY.

18. *Model of hydrographic signal*; shape pyramidal, base triangular, made of rough scantling, boarded up on one or more sides and surmounted by a staff bearing a distinctive flag. The color of the boarding and flag is either white or black, to suit the background. Height varies from 15 to 40 feet.

19. *Hydrographic sextant*, used for measuring the angles required to determine the position of the sounding boat. Made by E. Lorieux, père, Paris.

20. *Three-arm protractor* for plotting on the chart the position of the sounding boat. Made at United States Coast Survey Office.

21. *Deep-sea sounding machine for wire*, constructed from the original plans of Sir William Thomson, with the addition of an accumulator worked by coil springs. By means of the accumulator and its arrangements, the exact amount of wire paid out is registered; a strain can be put on the friction line attached to the reel at the instant the sinker strikes the bottom; and, in reeling in, the sudden strain brought on the wire by the rolling and pitching of the ship can be eased.

Made at the office from the designs of C. D. Sigsbee, lieutenant-commander, U. S. N., and assistant, United States Coast Survey.

22. *Sounding-rod and detacher* or a single rod to serve either for using and recovering a light sinker, or of detaching, with increased certainty, a heavy lead. The apparatus secures a large specimen of the bottom.

Made at office from designs of C. D. Sigsbee, lieutenant-commander, U. S. N.

23. *Water specimen cup* so constructed that it can be attached to any part of the sounding line as it is paid out, and detached as it is reeled in without materially affecting the opening or closing of the valves of the cups then under water. Specimens of the water can be thus obtained, at a single cast, from as many depths as there are cups employed.

Made at office from designs of C. D. Sigsbee, lieutenant-commander, U. S. N.

24. *Specimen cups*, several varieties, shipped in the lower end of a deep-sea lead to bring up specimens of the bottom.

Designed by Lieutenant (now Rear-Admiral) B. F. Sands, Lieut. H. S. Stellwagen, and Acting Master R. Platt, U. S. N., while serving as assistants in the survey.

25. *Detaching sinker*, *water-bottle*, and *specimen cup*: two varieties. Designed by Admiral D. D. Porter, U. S. N., and G. R. Wilson, of Washington.

26. *Massey's sounding indicator.*

27. *The Miller-Casella maximum and minimum thermometer* for deep-sea temperatures.

28. *The Negretti-Zambra deep-sea thermometer.*

The three preceding instruments are of British origin and make and are used in the Coast Survey as giving the most satisfactory results.

29. *Hydrometer*, with can and attached thermometer, for sea-water. Designed by J. E. Hilgard, United States Coast Survey.

30. *Self-registering tide-gauge*, as at present used in the survey. The record is made on a large horizontal cylinder driven by a balance-clock of peculiar construction. So soon as the paper is covered with curves made by the rising and falling of the float, the cylinder is taken out and another substituted. The first cylinder is then put into the reading-box, and the height of high and low water, and heights at every hour, are read off on a scale of equal parts and tabulated. For details see Directions for making tidal observations.

Constructed at the office from designs by R. S. Avery, United States Coast Survey.

31. *Dredge* for obtaining specimens of the bottom and of deep-sea fauna.

OFFICE AND PUBLICATIONS.

32. *Record books* ruled and of uniform size and color for each class of field-work and blank forms for computations, adopted in the Survey to secure system in the field and order in the archives.

33. *Chart* showing the character of the principal triangulation of the Coast Survey.

34. *Chart of the isogonic lines*, or the declination of the magnetic needle in the United States.

35. *Portfolio* containing twenty characteristic specimens of the *sailing charts* and *general charts* of the coast, drawn, engraved, and published at the office of the Coast Survey.

36. *Portfolio* containing forty-five similar specimens of *coast charts.*

37. *Portfolio* containing forty similar specimens of *harbor charts.*

38. *Electrotype plates*, alto and basso, 35 by 42 inches. (New York entrance.)

39. *Steel-faced plate* (Mount Desert Island). Deposit of iron is made upon this engraved copper plate by the galvanic battery from a solution of ferrous sulphate and ammonic chloride. The electrotype iron is very hard and retains magnetism permanently. Thickness of deposit, 0.035 millimeter, or about $\frac{1}{700}$ of an inch. Number of impressions unlimited, since deposit can be renewed at pleasure.

40. *Annual reports of the Superintendent.*

41. *Professional and scientific papers* relating to geodesy, astronomy, methods of determining differences of longitude, surveying, hydrography, terrestrial magnetism, tides, the Gulf Stream, and other kindred subjects connected with the various operations of the survey, including Coast Pilots and Tide Tables.

STANDARD WEIGHTS AND MEASURES.

42. *American standards* of length, weight, and capacity.

43. *Metric standards* of length, weight, and capacity.

44. *Invariable meter* compensated for temperature; designed by Saxton.

45. *Mirror comparator* for end-measures (Saxton's pyrometer).

46. *Vertical contact* level comparator; designed by Hilgard.

47. *Optical comparator* for comparing line-measures with end-measures; designed by Hilgard and Lane.

48. *Balance* for 1 pound, sensible to $\frac{1}{500}$ of a grain; designed and constructed by Hassler, with improvements by Saxton.

49. *Balance* for 25 pounds, sensible to one tenth of a grain with that load; designed and constructed by Saxton.

LIFE-SAVING SERVICE.

LIFE-SAVING SERVICE.

The necessities of civilization have developed in this country a programme for the aid and protection of navigation, in which one place is occupied by the Engineer Corps of the Army, charged with the labors of the lake survey and of river and harbor improvements; another by the United States Coast Survey, which furnishes the amplest possible sailing directions and guides, based upon comprehensive and diversified scientific studies of our shores and waters; a third by the Light-House Establishment, guarding all our coast approaches and principal rivers with its elaborate chains of night and day beacons for the guidance of mariners; a fourth by the Storm-Signal Service of the Army, whose semaphores give timely notice to seamen of the probable or actual approach of tempests; and the fifth by the Life Saving Service, which complements the functions of the others by providing efficient means for rescuing life, and, secondarily, property, imperiled on our strands by marine disaster.

The growth of the Life-Saving Service, like that of the other members of the quintuple activity with which it is co-ordinate, has been slow, considering the demand for such ministration, necessitated by the distinctively maritime character early assumed by the nation. The organization appears to have obscurely resulted from the institution of the Massachusetts Humane Society. This noble benefaction, which was first associated in 1786 and incorporated in 1791, erected in 1789 huts on the coast of Massachusetts for the shelter of shipwrecked persons, and in 1807 put up at Cohasset the earliest life-boat station, following it subsequently with others, which were all supplied with boats, rafts, mortars, and other apparatus for rescuing life, and were served by volunteer crews, paid upon each occasion of service at shipwrecks, and honored for signal conduct with medals and other tokens of appreciation. But notwithstanding its efforts, the efforts of similar enterprises at different points along the Atlantic seaboard, and the local endeavors of individuals in numerous shore communities, the annual loss of life by shipwreck on our coast, probably on account of the want of adequate means for rescue, and the insufficient and defective organizations of the institutions for that purpose, was, and long continued to be, frightful. Its enormity was notoriously such that in the debate preceding the action of Congress in 1854, Mr. Skelton, of New Jersey, and Mr. Chandler, of Pennsylvania, repeatedly asserted, perhaps with some exaggeration, but certainly without contradiction, that the loss of life on the coast of Long Island and New Jersey alone amounted to more than one thousand persons per annum, and it is this mass of annual calamity that has given the shores of Cape Cod, New Jersey, and Cape Hatteras their sinister and ineffaceable tradition.

The black chapter of marine disaster continued until 1848, when some wreck of more than usual horror brought the Government to consider its duty in the premises. The undying honor of the initial measure for the mitigation of these calamities belongs to the Hon. William A. Newell, of New Jersey, whose powerful appeal in the House of Representatives secured the passage of the act of August 14, 1848, appropriating $10,000 for providing surf-boats, rockets, carronades, &c., for aiding the shipwrecked on the coast of New Jersey between Sandy Hook and Little Egg Harbor. With this money eight stations were erected under the direction of the Secretary of the Treasury.

In March, 1849, $10,000 was appropriated for the same locality and $10,000 for other parts of the coast of the United States, with which six stations were added to the Jersey coast, eight built on Long Island, and two at points in Long Island Sound.

No complete record exists of the efficacy that followed these expenditures. But it is known that in the winter of 1849–'50 264 persons were saved on the coast of Long Island by the life-saving appliances and 291 on the coast of New Jersey, together with much other unrecorded life, and also property; and this fact, and notably the striking service rendered in the great storm of January, 1850, by the Ottinger surf-car in bringing ashore 201 persons from the wreck of the emigrant ship Ayrshire encouraged Congress to appropriate $10,000 on September 28, 1850, and $10,000 on September 30, 1850, with one of which appropriations two more stations were added to the Long Island coast in 1851, and with the other life-boats were placed at different points on the coasts of North and South Carolina, Georgia, Florida, and Texas. This was the first national extension of the wandering and uncertain movement which had begun for ameliorating the miseries and terrors of our seaboard.

In March, 1853, and August, 1854, there were appropriations of $10,000, $12,500, and $20,000, which were expended for life-boats on Lake Michigan and other points on the lakes and the Atlantic coast, and for the establishment of fourteen life-boat stations on the coast of New Jersey and eleven on the coast of Long Island.

At this time the degree of efficacy which had attended these measures began to slacken through the fatal incoherence of organization which had accompanied them. There were now on the Atlantic, Pacific, Gulf, and Lake coasts eighty-two life-boats without stations, besides those at the stations on the Long Island and New Jersey coast; and a few of them, which had been placed in charge of Government officials, were in good condition, but the larger part had been entrusted to corporations, ephemeral benevolent societies or private citizens, and, despite their proved usefulness, had been let go to ruin. In the absence of any paramount directing mind, the necessary transfer of stations to points at which the alterations of the coast had formed new snares for mariners had not been made; and the stations, through repeated depredation and constant neglect, had dwindled in efficiency. The terrible thickening of disasters at this time, and the frequent spectacle of wrecks breaking up within sight of shore, amidst screams and supplications for assistance, when useless boats and apparatus made help impossible, indicated the radical fault which only the later creation of an organized service repaired.

A dreadful shipwreck on the New Jersey coast, involving the loss of three hundred lives, inspired the passage of the act of December 14, 1854, which authorized superintendents for the coasts of Long Island and New Jersey, and keepers for each of the stations. Although the service remained inchoate and ineffective, a corresponding improvement followed this measure, which was increased by the additional step, taken in 1870, of employing six surfmen at each alternate station on the coast of New Jersey during three months of the winter. These, however, were still only surface remedies, and renewed disasters in the winter of 1870–'71 caused the Treasury Department to make vigorous representations upon the subject to Congress already roused by the frequency and horror of such calamities. These representations led to a sudden and splendid development of the Life-Saving Service, which was effected by the appropriation in April, 1871, of $200,000. The act also authorizing the Secretary of the Treasury to employ crews of experienced surfmen at such stations and for such periods as he might deem necessary and proper.

A report upon the condition of the stations was made, under orders, by Capt. John Faunce, of the Revenue Marine, and the exhibit determined the Hon. George S. Boutwell, then Secretary of the Treasury, to authorize a thorough reorganization of the service. Under his direction the work was at once begun. With the view of bringing the stations within an average distance of 3 miles of each other, twelve new station houses were built on the coast of New Jersey and Long Island; the existing stations were either rebuilt or enlarged; all were furnished with the most approved and appropriate apparatus; a suitable quantity of beds and bedding for the use of the surfmen and those they rescued was provided for each; efficient officers and crews displaced the incapable; drill and exercise in the use of the boats and apparatus was instituted; the constant nocturnal patrol of the beach between the stations was established; a signal code was devised; the coast was districted; elaborate regulations for the government of the stations were promulgated; examinations, periodical inspections, the keeping of accounts of expenditures, the journalizing of transactions and occurrences, and the forwarding of returns and reports were exacted; in brief, the service became organic, and entered upon a career of usefulness unsurpassed by any similar service in the world, the proof and epitome of which are in the fact of the reduction of the former frightful annual loss of life to an average for the last five years of about three persons per annum. The details of the reorganization were entrusted to the Revenue Marine Division, then under the charge of Mr. S. I. Kimball, under whose administration the service has since remained.

By act of March, 1871, two additional stations were established on the coast of Rhode Island; by act of June, 1872, nine stations were erected upon Cape Cod; and by act of March, 1873, twenty-one more upon the coast from Maine to North Carolina. By the subsequent act of June 20, 1874, which provided more completely for the organization of the service than any of those preceding, fifty-one additional stations were authorized for points on the Atlantic, Lakes, and Pacific coasts; and the later act of March 3, 1875, added two more on the coast of Rhode Island and Long Island Sound, making one hundred and fifty-five in all. The important act of June 20, 1874, which authorized the establishment of the stations in a classified order, was the result of the report of a commission, designated by the Secretary of the Treasury on the 6th of March, 1873, composed of Mr. S. I. Kimball, chief of the Division of Revenue Marine, and Capts. John Faunce, and J. H. Merryman, officers of that service, the latter officer being the inspector of the Life-Saving Service, who made a thorough study of the coast and its requirements, involving personal inspection of the localities, upon which to base their recommendations.

The foregoing sketch of the historical development of the service necessarily preludes some account of its present organization. Under the system adopted, the sea and lake coasts of the United States are apportioned into eleven life-saving districts, each of them under the supervision of a local officer called a superintendent. Inspection is provided for by the detail of an inspector and two assistants, all officers of the Revenue Marine. Two officers of the Revenue Marine also act as superintendents of construction. Each station-house is under the charge of an experienced surfman, called a keeper, who commands a selected crew. The entire service, by virtue of its relation to commerce, is affiliated upon the Treasury Department, and is under the immediate government of one of its officers, as above shown.

Districts.—The districts are distinguished by numbers, from one upwards, beginning with the most northerly or easterly. The first district comprises the coasts of Maine and New Hampshire, from West Quoddy Head to Rye Beach; the second, the coast of Massachusetts, including the island of Nantucket; the third, the coasts of Rhode Island, Block Island, and Long Island, from Narragansett Pier, Rhode Island, to Coney Island, New York; the fourth, the coast of New Jersey, from Sandy Hook to Cape May; the fifth, the coasts of Delaware, Maryland,

and Virginia, from Cape Henlopen to Cape Charles; the sixth, the coasts of Virginia and North Carolina, from Cape Henry to Cape Hatteras; the seventh, the eastern coast of Florida; the eighth, the coasts of Lakes Ontario and Erie; the ninth, the coasts of Lakes Huron and Superior; the tenth, the coast of Lake Michigan; and the eleventh, the Pacific coast, from Cape Flattery, Washington Territory, to Point Conception, California.

Superintendents.—Each district is in charge of a superintendent. He is appointed only after careful examination by an Examining Board, consisting of two persons, one of them the inspector of life-saving stations. He is required to be not less than twenty-five, nor more than fifty-five years of age; to be familiar with the coast of his district; to be conversant with the proper management of surf-boats and life-saving apparatus; to be able to read and write the English language correctly, and to have a knowledge of notation, numeration, the four rules of arithmetic, and the elementary principles of book-keeping. He is charged with the superintendence of the stations in his district. His duty is to visit every station at least twice during the winter months, and three times during the remainder of the year. Upon each visit he carefully examines the condition of the building and its apparatus, books, furniture, &c.; and musters and inspects the crew of the station, whom he exercises in the use of the boats and apparatus, according to a prescribed form. After each examination he makes a written report of the result to the Department through the inspector. He also makes requisition through the same officer for repairs, supplies, or outfits which he finds needed by any station. He scrutinizes the reports of wrecks which keepers are required to make and forward to him upon the occurrence of each disaster, and sees that they contain all the particulars before forwarding them through the inspector to the Department. In cases of vacancy occurring through any cause, he selects and nominates to the Department suitable persons for keepers of the stations, temporarily employing meanwhile proper agents to discharge the duties. He also acts as a disbursing officer for the payment of crews, and for certain supplies which he is authorized to purchase upon requisition. These superintendents are vested with the powers and duties of inspectors of customs, and labor for the prevention and detection of smuggling upon the coasts of their respective districts. Their pay is $1,000 each per annum, except those of the third and fourth districts, who receive $1,500 each, in consideration of the more arduous duties which those important coasts involve. The third district is also allowed an assistant superintendent at a compensation of $500 per annum.

Keepers.—The keepers of the stations are selected on account of their reputation as brave and expert seamen, and their skill in controlling boats beset by the dangers incident to wrecks stranded in angry water. They are the captains of their respective crews, and must have the qualities which inspire the confidence and obedience of their men. The immediate care and government of the stations are confided to them, and they are accountable for the condition of the buildings, boats, apparatus, &c., and for the proper use of all supplies under their charge. They are prohibited, during the winter season especially, from engaging in any business or occupation which involves absence from the stations or interference with their duties. They are required to have received sufficient education to enable them to keep accounts of all expenditures at the stations, journalize all transactions and occurrences, and make monthly reports, and all other necessary communications to the superintendents. The duties of a keeper of the life-saving station are extremely important. During the season of storms, which ranges on our coast from four to six months (the Lakes excepted) he resides at the station with his crew, and gives his whole time and attention to keeping a lookout for vessels in distress. One of his most especial cares is to see that the beach between his station and the two to the right and left adjoining is constantly patrolled by his men all night and during the stormy or thick weather in the day also, in order that any vessel driven ashore may be at once descried. When a wreck is discovered, the keeper's first duty is to communicate the fact when necessary by signal to the adjoining stations, and then to prepare the apparatus and boats for service. Upon boarding wrecks, the preservation of life is his first consideration; that of property is secondary. All cargoes, or portions thereof that come ashore, he guards in the interest of the owners and for the protection of the revenue. After a wreck he fully reports the particulars on a printed form to the superintendent. He sees that the boats and apparatus are carefully cleaned, dried, and repaired after each occasion of service. When two or more keepers and crews meet at a wreck, they are required by regulation to co-operate harmoniously, the most experienced keeper assuming the general direction. The drill and exercise of crews in the use of the boats and apparatus are frequent, and in addition to those required upon the visits of inspectors and superintendents, keepers must get out their respective boats at least once a month for the same purpose, but are not allowed to expend powder, shot, or rockets in the exercise unless by authority. The lakes are closed by ice to navigation during the winter months, and the active season for keepers in that locality is during the spring and fall, when heavy gales and storms are prevalent; but elsewhere upon the coast the keepers are required to remain at the stations during the inclement portion of the year (or longer if the Department should so direct); this being a period varying in duration according to the degree of latitude, but comprised between November and May. The keeper of a station has possession of its keys when closed, and visits it frequently during the summer to see that everything about it is in proper order. In case of his illness or incapacitation at any time, the keeper of the next adjoining station takes charge until his recovery, or the appointment of his successor. His remuneration is at present only $200 per annum, payable quarterly—an insufficient sum—which it is hoped Congress will increase, in consideration of the dignity, value, and responsibility of his functions.

Crews.—As stated hereafter, there are three classes of stations, respectively designated complete life-saving stations, life-boat stations, and houses of refuge. To a *life-saving* station there is allotted a crew of six persons, permanently resident at the station-house during the season, and paid at the rate of $40 per month while they serve, and $3 each for every occasion of shipwreck at other times where they render assistance. The *life-boat* stations are served by twelve volunteers, not resident at the station-house, but summoned whenever a wreck occurs, and paid at a rate not to exceed $10 each for every time they save life at such an occurrence. The *houses of refuge* are in charge of a keeper only. The surfmen who form the crews of the two first classes of stations are the *élite* of our coast, hardy and experienced seamen, adepts in managing boats in heavy seas and near wrecks at seasons of the sternest marine ordeal. Their skill with the oar in the crash and convulsion of shipwrecking seas is incredible, and such is their mastery that they deliberately prefer, in attempts at rescue, their comparative cockle-shell of a surf-boat to the superb self-righting and self-bailing mahogany life-boats devised by the English. They are engaged annually, nominally for the year, by signing articles. The efficiency of the stations being, of course, dependent upon discipline, they are required to render the strictest obedience to the keepers. The duty which alone of all others equals that of their service at wrecks is their maintenance of the patrol. For this purpose the winter night is divided into three watches of four hours each. At each of these periods two men set out from the station, one proceeding toward the nearest station on the right, the other toward that on the left (the stations being from 3 to 7 miles apart), and traverse the beach till they meet the patrol coming from the contiguous station, when they exchange signals and return. Each patrolman carries a beach-lantern and a red Coston hand-light. His severe and laborious march is sustained nightly in all weathers; and as he plods through the darkness over the hummocked beach he keeps perpetual watch for the token of some vessel stranded in the obscure offing. Should he discover such he instantly ignites his red Coston light, both to alarm his station and to notify the wreck that succor is at hand, and rushes back to the station-house to take his part in the thrilling work of rescue.

Stations.—As already indicated there are three classes of stations. Those known as complete *life-saving* stations are established at localities exposed to the actual ocean, on long beaches or outlying bars, generally void or sparse of population, and therefore calling for resident crews. They are placed at points which statistics of disasters prove the frequent scene of shipwrecks, and usually at an average distance of 3 miles apart. The station-houses are structures mainly of pine, a story and a half in height, 44 feet long by 18½ broad (inside dimensions); of pointed architecture, painted in three coats of oil, brown in color, with trimmings of darker brown, and dark-red roofs. The older station-houses have less ample interiors, but the new and improved structures are designed to contain five rooms. In the lower story, one of oblong form, for the boat and heavy apparatus, and one adjoining for the mess-room of the crew; in the upper story, one furnished with cot-beds, for the accommodation of shipwrecked persons, one for the storage of lighter articles belonging to the station, one for the sleeping chamber of the crew, and one for the use of the observer of the Signal Service. The number of complete life-saving stations is one hundred and twenty-six.

The *life-boat* stations are of similar materials and architecture, but not having to accommodate keepers or crews, contain only one large apartment with closets, and are 20 by 40 feet inside dimensions. This house contains the life-boat, mortar and shot, hand-cart lines, and other lighter articles. These stations are located near populous places in the vicinity of piers and harbors. When built upon piles or upon wharves or piers, as they sometimes are, they are furnished with what are termed inclined platforms, a species of trap in the lower floor furnished with rollers, upon which the life-boat rests, and which, lowered at an angle determined by the height of the water below, permits the boat to be easily launched by sliding down this sloping plain. There are twenty-four of this class of stations. Their keepers and the members of the volunteer crews, by which they are served, are supposed to reside in their neighborhood.

The *houses of refuge*, which constitute the third class of stations, are only five in number, and are all upon the eastern coast of Florida. For nearly 500 miles this coast is a desolate waste, with shores so bold that stranded vessels are usually thrown high upon the beach, and crews wrecked by its frequent gales and tornadoes are less in peril of death by drowning than by hunger and thirst when cast ashore. Hence these houses are designed to offer shelter and sustenance, these being the main necessity of the situation. They are a story and a half high, supported upon posts, are about 35 by 15 feet in dimensions, and are built of Florida pine and light wood, and roofed with cypress shingles. Their architecture is of the type frequent in the southern part of our country, characterized by a large chimney, sloping roof, and ample verandas on every side. Instead of glass the windows are furnished with brass wire-gauze mosquito netting and solid outside shutters. Each house is inhabited by a keeper and his family, is provisioned sufficiently to support twenty-five persons for ten days during the season of hurricanes, having also capacity for sheltering that number. A boat-house about 28 by 12 feet in dimensions is attached to each station, housing one 22-foot surf-boat and one 12-foot skiff for keepers' use, both of galvanized iron, furnished with oars, masts, and sails.

The estimated cost of these stations, with their equipments, which the actual cost closely approaches, is as follows: $5,302.15 for a complete life-saving station, $4,790 for a life-boat station, and $2,995 for a house of refuge.

Apparatus and equipments.—The apparatus, &c., used at the stations formed part of the national exhibit at the Centennial Exhibition.

First in order may be mentioned the surf-boat, which is either metallic or cedar, insubmergible; usually 25 feet long, 6 feet broad, 2 feet and 3 inches deep, made buoyant with air-chambers running along the sides under the thwarts, having cork fenders on the sides for protection in case of collision with hulls or wreckage, and the bottom considerably flattened for convenience in launching from our flat beaches. These boats are painted red, with a black streak on the gunwale. They are generally used at the complete life-saving stations, and are the favorite of the crews.

The life-boats used at the stations of the second class are a modification of the English pattern. They are 26 feet 8 inches by 7 feet 3½ inches in dimension, and are so buoyed at stem and stern with air-chambers, and weighted in the keel, as to be self-righting when capsized. Their decks being so placed as to be always above the water-line, with delivery pipes leading through to their bottoms; they are also, on the principle that water seeks its level, self-bailing. A boat of this species, when thrown over, as may sometimes happen by a monstrous wave, comes right side up, full of water, of which she empties herself in twenty seconds. These boats are strongly built, being of mahogany, double planked diagonally, and are very heavy. Their main disadvantages are their great cost, and their weight, which makes their transportation from the station to the water (except where they can be launched directly from their houses into deep water) impossible, unless at points where horses are available. Their splendid advantages are obvious. One of them was displayed at the Exhibition, afloat on the lake in front of the station, and its self-righting and self-bailing qualities were illustrated by a working model 4 feet in length, and made in exact proportion to the actual life-boat. Their draft is considerable, which also makes them unsuitable for use on the greater part of the Atlantic coast, which is bordered with shoal water. An admirable boat of this description, which is believed to be a marked improvement, for our purposes, on the English model, has been devised by Capt. John M. Richardson, superintendent of the first life-saving district, and is in use at Station No. 4, White Head Island, Maine. It draws 4 inches less water than the smallest English boat; is over 1,400 pounds lighter; has flat decks to the air-cases at each end, an advantage over the convex surfaces of its prototype; is built of cedar and white oak, and framed and planked like ordinary boats, which makes it lighter and less expensive than the diagonal double-planked mahogany hull of the other, and delivers the water it ships through shuttered scuppers in the sides, less liable to become choked with ice in our high latitudes than the delivery pipes of its model.

For the transportation of boats to the place of launching on the beach there is a peculiar boat-carriage, very strongly made of oak and hickory, consisting of a skeleton reach 16 feet long resting on solid bed-pieces at either end, and mounted on fore and hind wheels 4 feet in diameter and of equal dimensions, the whole being furnished with a pole and whiffletrees for two horses. When horses cannot be had the surf-boat is drawn upon this carriage by the crew.

The life-car or surf-car, which was invented by Capt. Douglass Ottinger, of the Revenue Marine, in 1848, is a species of covered boat made of galvanized iron, capable of holding from two to four persons, and, with a ring at each end, by which it is suspended with a pulley-block to a hawser, rigged between a wreck and the shore, and upon which it is pulled to and fro with hauling lines. It is entered by a hatchway closed with a sliding cover, which is pierced with air-holes, the perforations being made from within so as to raise the edges of the metal, and thus prevent water from entering as the car is hauled through the surf. Many lives have been saved by its instrumentality.

Another device employed for life-saving, and which may be used with hauling-lines, with oars, or with sails, as occasion requires, is the Rider life-raft. It is made of two pointed cylinders of canvas, each 26 inches in diameter and 22 feet long, which are coated with gutta-percha and inflated with air, and are secured together by hoops of hickory at equal distances, so as to sustain an intermediate frame-work, the whole forming a structure of 7 feet and 2 inches wide. It sits lightly on the water; is insubmergible, and its broad surface affords accommodation for a large number of passengers. For rowing, it is fitted with four oars for pulling and one for steering.

Still another contrivance for use with hauling-lines by suspension to a hawser stretched between a wreck and the shore, is the breeches-buoy, a circular life-preserver of cork, with a pair of short, stout, canvas breeches attached, into which the person to be brought ashore gets and sits for his landward journey through or over the surf. A similar invention is the life-buoy or cradle devised by Mr. H. Cordes, of Bremerhaven, which is simply a species of basket made of cork, eliptical in shape, with a sagging of canvas bands interwoven across, slung to the hawser like the breeches-buoy. In this a person to be rescued lies and is pulled ashore.

To effect the communication with a wreck, by which a hawser is stretched between it and the shore for the employment of the surf-car, breeches-buoy, &c., a shot is fired with a line attached, which, falling over the wreck, enables those on board to drag it in with the hauling-lines and the hawser fastened thereto. To carry the shot over the wreck mortars, guns, and rockets are employed. The mortar used is of the eprouvette pattern; caliber, 5½ inches; weight, with its bed, 288 pounds.

It is furnished with twelve spherical solid balls, 24 pounds each. The charge of powder is from 2 to 4 ounces. It can be relied upon to send a ball from 300 to 400 yards. For the transportation of the mortar or similar apparatus over the beaches there is a strong hand-cart, 4 feet 9 inches long, by 3 feet wide, with wheels of 4 feet diameter, made of oak and iron, with rims of from 4 to 5 inches broad.

Another invention for sending a shot-line to a wreck, produced by Cordes, of Bremerhaven, is a gun of 3-inch caliber, mounted on a 4-wheeled carriage, which also carries the ammunition, implements, and lines. The extreme range of this gun is about 560 yards. The projectile used is peculiar, being a hollow, cylindrical, pointed shot, 20 pounds in weight, 3 inches diameter, and 20 inches long, through which the shot-line is rove with an ingenious contrivance for preventing the line from breaking by the impulse of the discharge from the mouth of the gun. The same inventor has contributed what is called a knapsack gun, being a small brass cannon mounted so that a strong surfman can carry it strapped to his back, and which has a range of 300 yards. He has also invented a hand or shoulder gun which has a range of 150 to 200 yards. The projectiles and method of firing are the same in all his guns.

The Liliendahl rocket apparatus is a portable contrivance for effecting communication with wrecks. It consists of a tube of iron upon a tripod for giving direction to the rocket, which is of steel and carries, instead of the stick usually attached to rockets, a loop of steel rod, to which the line is secured by a steel-wire lanyard. The rocket is capable of carrying a line 350 yards.

The Cordes apparatus has only recently come into notice, but all the other articles of boats, rafts, surf-cars, mortars, rockets, &c., are furnished to the stations of the first and second class, which are also provided, for the safety of the crews, with suits of the Merriman rubber life-saving dress, made famous by the exploits of Paul Boyton, and also with cork-life belts, which the men are required by regulation to wear when they go out in the boats to rescue. The stations are also furnished in suitable quantities, according to their respective wants, with a number of articles of ship's stores and equipments, such as axes, buckets, calking irons, hatchets, lanterns, marline-spikes, medicine-chests, oakum, sail-needles, speaking-trumpets, twine, &c. Such of the latter articles as are necessary are also provided for the houses of refuge, which are likewise provisioned with salt beef and pork, navy bread, coffee, and sugar.

The following is a specific catalogue of the exhibit at the life-saving station erected on the Centennial grounds:

1. Self-righting and self-bailing life-boat, with following attachments:

Masts, sails, rudder and yoke, tiller, row-locks, oars, boat-hooks, canvas boat cover, transporting trucks and turn-table, skids, ridge-pole and stanchion.

2. Surf-boat, with following attachments:

Boat wagon (complete), oars, boat-hooks and warp, boat anchor, thole-pins, rubber bailing buckets, carriage wrench, hand-grapnels and warp, cork life-jackets, boat cover (canvas).

3. Howitzer, with following attachments:

Carriage (complete) and containing shot-lines, hauling line and guide posts, wooden maul, spare article box, containing rubber springs, leather sabots and friction primers, iron shot or elongated projectiles.

4. Life-car (metallic), with following attachments:

Manila hawser, hauling line, or double "whip"; large and small tackles, selvagee strops; shot-line, with box and faking pegs; tally-board, with instructions to wrecked persons in the application of life-car apparatus; mortar and bed; spherical shot (24-pounder), shot wires, cannon fuzes (water-proof); sand anchor, with bull's-eye and strap; shovel.

5. "Lilliendahl" rocket, with following attachments:

Rocket range, "Lilliendahl" rockets; connecting shackles, with rocket line (complete).

6. Breeches buoy, with sling and runner block.

7. Life-basket (cork).

8. Life-raft, with following attachments:

Rubber cylinders, with air-pumps; oars, boat-hooks, thole-pins (spare), cork floats, and life-lines.

9. Knapsack gun, with following attachments:

Carriage (complete), to be transported upon the back of a surfman; elongated projectiles (iron); rubber springs, leather sabots, shot-line, box and faking pegs.

10. Shoulder gun, with following attachments:

Swivel, projectiles (iron), sabots, cone key, oil-can, cleaning rod.

11. Loaded mace (for throwing lines by hand over a wrecked vessel).

12. Merriman's life-saving suits (rubber).

13. Equipments:

Hand-cart (for transportation of life-car apparatus); large beach light and staff, (for night work on the beach); signal lanterns (brass); lamp-feeder, powder magazine, powder flask, speaking trumpet; marine glasses (binocular), with case; calking mallet and iron; claw hammer, gimlets, grindstone and box; monkey wrench, hand-saw, jack-plane, axes, hatchets, marline-spikes; "Costin's" night signals, with holders; signal rockets and staffs; sewing palm, sail-needles, branding iron ("U. S. L. S. S."); fire buckets (rubber); sponge (boat); rocket and lantern stand; clock; signal flags ("U. S. L. S. S."); national ensigns.

14. Medicine chest, containing the following medicines, &c.:

Brandy and sherry wine (in flasks), ammonia carb., snuff, Monsel's salt (to arrest bleeding), pills of camph. and opii, adhesive plaster, sinapisms, probangs (for clearing the throat), sponge, bandages, wadding, flannel, and pins; printed directions of the most approved method of "resuscitating the apparently drowned."

15. Stores:

Manila cordage, marline, spun yarn, cotton sewing-twine, putty, white lead, paint oil, signal oil, boat nails, tacks, sand-paper, emery-paper, lamp-wicking, stove-blacking, rottenstone, whiting, soap, brooms.

16. Furniture:

Ten cot-bedsteads (of iron and canvas); ten mattresses (husk), with linen covers; en pillows (husk), with linen covers; twenty woolen blankets ("U. S. L. S. S." pattern), chairs, mess table (with drawers), desk (writing), washstand (iron), water pitcher, wash-bowl and pitcher, water cooler, glass tumblers, cocoa mats, cuspidors, dustpan and brush, painters' duster, brushes (scrubbing), brushes (stove-blacking), crash toweling, watering can, water pails.

17. Cooking utensils:

Cook stove and fixtures complete, including extra set of fire-brick and grate; coal scuttle, shovel and poker, mess pans, coffee pots, tea kettle, tin pans, plates and cups, tablespoons, teaspoons, knives and forks, mess kettles (iron, with covers), skillet, wash boiler, butcher knife, and large fork.

18. Books, blanks, &c.:

Register, journal, receipt and expenditure book, "Regulations for the Government of the United States Life Saving Service;" rocket and mortar drill; specifications and plans of construction of United States life-saving stations on Pacific and Lake coasts; specifications and plans of construction of self-righting and self-bailing life-boat; blank shipping articles (U. S. L. S. S.); blank wreck report (U. S. L. S. S.); blank quarterly report (U. S. L. S. S.); blank requisition for supplies (U. S. L. S. S.); blank quarterly estimate for funds (U. S. L. S. S.); blank pay-rolls (U. S. L. S. S.); blank vouchers, purchases, and repairs; blank inventory of public property; blank vouchers for services and traveling expenses attending drill and exercise; blank requisition for official postage stamps; blank report of official postage stamps; blank requisition for blank forms; blank account current of disbursement by superintendents; blank abstract of disbursements by superintendents; blank weekly transcript of journal; blank statement of accounts by superintendents.

19. Special exhibits:

Life-saving medals, gold (in case), first class; life-saving medals, silver (in case), second class; 24-pounder ball (being the first shot fired in the United States to save life from shipwreck). This ball, with line attached, was thrown over the ship Ayrshire, wrecked on Squan Beach, New Jersey, January 12, 1850, saving 201 lives.

20. Model life-car apparatus, including the model of a vessel ashore and in distress, the whole showing practically the method of rescuing life from the perils of the sea by means of the life-car.
21. Diagram of life-car.
22. United States Life-Saving Service signal code.
23. Model of self-righting and self-bailing life-boat.

Superintendents of construction.—The stations are built and kept in repair through the agency of superintendents of construction, located for this purpose at New York. The two officers of the Revenue Marine acting in this capacity supervise the work under the contracts and agreements made by the Department for the construction and repair of stations, and of all boats, boat-carriages, &c., and see that they are properly carried out. They have oversight of all plans and specifications, inspect all materials, and are responsible for all constructions being effected in a workmanlike manner.

Inspectors.—The inspector is a captain of the Revenue Marine, assisted by two lieutenants of the Revenue Marine, all detailed for this duty. He and his assistants exercise a general supervision over all the districts. The duty of an inspector involves the personal scrutiny of every station along the whole coast, at least once a year, and oftener if directed by the Department. He is accompanied in each district by its superintendent. He notifies the stations of his intended visit in advance, so that the surfmen may be assembled to meet him. He exercises the men in the use of the boat and car, causing them to launch and to go and return through the surf; also in the use of the mortar and rocket apparatus, all as if actually engaged in the work of saving life. He closely examines everything in and about the station, ascertaining that all is in proper condition. He is required to know the use and application of every article, and to see that the keeper and surfmen have the same knowledge. After each visit he makes a full report to the Department, containing such recommendations as may be called for. All requisitions for supplies and repairs are received by him from the superintendents of the districts, which he approves or disapproves, and forwards to the Department. He also forwards all reports which he receives in the same way. Capt. James H. Merryman has ably performed the important duties of this office since June, 1872.

Fiscal management.—The Life-Saving Service is annually appropriated for by Congress. The cost of new stations is defrayed by special appropriations. The appropriations for the annual running expenses are two; one for the Life-Saving Service, covering expenditures for salaries and pay; the other for contingent expenses, providing for all other current outlays. For the year ending June 30, 1877, the appropriation for the purpose first named was $201,580; the other appropriation was $30,000.

The salaries of the superintendents of the districts and of the keepers are fixed by law. The wages of the surfmen are prescribed by the Department. All payments of salary and wages are made quarterly upon pay-rolls, in accordance with estimates which the superintendents of the districts are required to forward at least twenty days before the expiration of the quarter. Payments must be made in lawful money, and only to the persons to whom they are owed. No purchases of any description for the stations can be made without the authority of the Department. When such authority is obtained, the purchases are made upon written proposals obtained from three or more responsible dealers. All supplies and outfits of any considerable quantity are procured by contract made upon proposals obtained by public advertisement, and are rigorously inspected upon delivery. Bills and vouchers are required to be made out in detail and presented in duplicate.

Co-operation of the Storm-Signal Service.—By the act of March 3, 1873, the Storm-Signal Service of the Army made an affiliation with the Life-Saving Service, and is now directly connected with the stations at Sandy Hook, Monmouth Beach, Squan Beach, Barnegat, Atlantic City, and Peck's Beach, New Jersey; at Cape Henry, Virginia; and at Kitty Hawk and Little Kinnakeet, North Carolina. The signal stations at Cape May, Oswego, Buffalo, Erie, Cleveland, Grand Haven, Chicago, Milwaukee, and San Francisco, are also available for the Life-Saving Service. The connection has worked beneficially in two ways; first, by affording means of immediate communication between the stations, the superintendents, and the Department, making them upon occasion mutually clairvoyant of all occurrences and operations, and also enabling important orders to be given from any center of authority, local or superior, at moments of exigency or crisis; secondly, by diminishing the number of wrecks through the display of cautionary signals warning vessels to remain in port, or to avoid the lee shore, upon indications of approaching tempest.

The act of June 20, 1874, greatly promoted the efficiency of the service in many ways, and among them in authorizing means for obtaining statistics of disaster to shipping, which are now annually appended to the reports of the service, and are of great value in determining points at which life-saving stations, light-houses, &c., should be established, or to which they should be removed, by showing the recurring frequency of shipwrecks at those localities. The information they afford is obviously also of great value to ship-owners, underwriters, and all persons interested or concerned in commerce.

The same act authorized the award of gold medals to persons distinguished for signal gallantry in saving life, and silver medals for persons who rendered similar service under less trying circumstances, a measure highly promotive of the work of life-saving by adding to it the stimulations of public honor.

The annual report of the Life-Saving Service for the past year shows that an extraordinary success has attended its operations, especially since its reorganization in 1871. There are no statistics anterior to 1850 of the dreadful mass of marine calamities which made Cape Cod, New Jersey, and Cape Hatteras, each as much a by-word as Cape Horn.

Between 1850 and 1871, the imperfect data which have been collected, and which represent the merest fragment of the traditional reality, show an average of 25.6 persons lost per annum on the Long Island and New Jersey coasts. Since 1871, on the same portions of the coast, the loss per annum has been only 3.2 persons, an amazing diminution, amounting, in fact, to 87½ per cent. It is certain that under the systematic operations of the service, the succession of Golgothas once presented by our coast, belongs wholly to the past. What was once current tragedy has become legend, and the platoons of surfmen have destroyed the horrors of the shore. It is probable that with the yearly growth of its organization, and the improvement of its appliances and methods, the service will yet make every life imperiled near the shore absolutely safe, complementing jeopardy with deliverance.

A gratifying fact connected with the history of the service is that it has been furthered in Congress, as all scientific and purely humane interests should be, by men of the most contrary political opinions, nor has any party consideration ever been allowed to affect its organization. Its object is to make our national coasts secure against death by shipwreck to voyagers, and the measures promoting this end have been carried through by the active and generous support of all political parties.

MINT AND COINAGE.

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HISTORY OF THE UNITED STATES MINT AND COINAGE.

The Mint, by the act of April 2, 1792, was established "for the purpose of a national coinage," at Philadelphia, that city then being the seat of Government. By the same act it was provided that the money of account should be expressed in dollars or units, dimes or tenths, cents or hundredths, and mills or thousandths; and that all accounts in the public offices, or proceedings in the courts of the United States, should be kept and had in conformity therewith.

Although the ideal unit of the colonial money of account was originally called a pound, the "Spanish dollar" was for many years before the establishment of the present form of government the money of commerce and practical monetary unit, and whether obligations were discharged in gold, silver, or paper money, a certain number of Spanish dollars constituted, specifically or by implication, the standard or measure of value. This had much to do with the selection in 1792 of the dollar as the monetary unit.

By the act referred to, provision was also made for the issue of gold, silver, and copper coins. The gold coins were to be rated at 24.75 grains of pure gold to the dollar, and the silver coins at 371¼ grains to the dollar, the relative value of the two metals being declared in the same law to be as 15 to 1. These standards were continued till 1834, when an act was passed reducing the pure gold from 24.75 to 23.20 grains to the dollar.

By the act of January 18, 1837, the fineness of the gold was increased about three-fourths of one thousandth by changing from the standard of .899225 to 900 thousandths, which increased the pure gold to the dollar from 23.20 to 23.22 grains, at which it still remains.

By this act the fineness of both the gold and silver coins was fixed at 900 thousandths. The silver dollar weighed 412½ grains troy, and the gold was issued at the rate of 25.8 per dollar in value, the actual gold dollar coin not being authorized until 1849. The relation of the metals was, therefore, almost exactly 16 to 1.

The quantity of pure silver in the dollar, as originally fixed, was not changed from the date of its issue down to April 1, 1873, when it was discontinued, but the weight of coins of less denomination was reduced from 412½ to 384 grains standard per dollar of nominal value by the act of February 21, 1853, which fixed the weight of the half dollar at 192 grains, and the quarter dollar, dime, and half dime, at one-half, one-fifth, and one-tenth of the said half dollar.

The standard weight of these latter coins was, by the coinage act of 1873, increased to 385.8 grains to the dollar, composed of two half dollars, four quarter dollars, or ten dimes, and corresponding in weight and fineness with the five-franc coin of the Latin States of Europe. These coins are issued at the rate of 1.24414 per standard ounce, 803¾ ounces giving coins of the nominal value of $1,000.

The coinage act in effect abolished the silver dollar of 412½ grains troy (371¼ grains pure silver) and declared the gold dollar of 25.8 grains, nine-tenths fine (23.22 grains pure gold) the unit of value, and thus legally established gold as the sole standard or measure of value.

The issue of copper coin commenced in 1793, silver in 1794, and gold in 1795.

Branch mints were established in 1835 at New Orleans, La., Charlotte, N. C., and Dahlonega, Ga., in 1854 at San Francisco, and in 1870 at Carson City. An assay office was established in New York in 1854, Denver in 1864, Boise City, Idaho, 1872, and Helena, Mont., in 1874. These establishments were not distinct institutions, but branches of the mint, managed by superintendents, who were subject to the general control of the Director of the Mint at Philadelphia. The coinage was conducted under this organization until the 1st of April, 1873, when the new law became operative, which established the mints and assay offices as a bureau of the Treasury Department, placed the several institutions upon substantially an equal basis, and brought them under the general supervision of the chief officer of the bureau.

The manufacture of the minor coins is confined by law to the mint at Philadelphia, where also all dies for the coinage and for national medals are executed.

Prior to April 1, 1873, no statutory provision authorizing the striking of medals existed, the business having been carried on since 1856 under departmental authority only, but the act of 1873 provided that national and other medals should be struck by the coiner of the mint at Philadelphia, under such regulations as should be prescribed by the superintendent with the approval of the Director of the Mint.

DESCRIPTION OF UNITED STATES MEDALS EXHIBITED AT THE INTERNATIONAL EXHIBITION 1876.

No. 1. Washington before Boston.

Obverse: Bust of Washington.

Reverse: Washington and officers on horseback; Boston in the distance.

No. 2. Major-General Gates, for Saratoga.

Obverse: Bust of Gates.

Reverse: General Burgoyne surrendering his sword to General Gates; troops in background.

No. 3. General Daniel Morgan, for Cowpens.

Obverse: An Indian queen placing a wreath on brow of General Morgan.

Reverse: Combat—Americans pursuing retreating British.

No. 4. Col. John Egar Howard, for Cowpens.

Obverse: A mounted officer pursuing foot soldier bearing a stand of colors; Victory with palm branch descending between them.

Reverse: Legend, inclosed within laurel wreath.

No. 5. Col. William Washington, for Cowpens.

Obverse: A mounted officer leading American cavalry in pursuit of British troops.

Reverse: Legend, inclosed in laurel wreath.

No. 6. Col. George Croghan, for Sandusky.

Obverse: Bust of Colonel Croghan.

Reverse: American Fort Stephenson, at Sandusky; English and Indian line attacking fort.

No. 7. Major-General Harrison, for the Thames.

Obverse: Bust of General Harrison.

Reverse: Battle of the Thames.

No. 8. Governor Isaac Shelby, for the Thames.

Obverse: Bust of Governor Shelby.

Reverse: A female placing laurel wreath on a stack of arms; drum, cannon, &c., at her feet.

No. 9. Major-General Scott, for Chippewa and Niagara.

Obverse: Bust of General Scott.

Reverse: Inscription inclosed in wreath.

No. 10. Major-General Gaines, for Fort Erie.

Obverse: Bust of General Gaines.

Reverse: Victory placing laurel wreath on the cascabel of a cannon fixed upright in the ground; helmet and cannon-balls on the ground.

No. 11. Major-General Porter, for Chippewa, Niagara, and Erie.

Obverse: Bust of General Porter.

Reverse: Figures of Victory and the Muse of History; Victory holding flags; the Muse recording the victories.

No. 12. Major-General Brown, for the same.

Obverse: Bust of General Brown.

Reverse: The Roman fasces, surrounded by British colors, swords, muskets, &c.; laurel wreath hangs from top of fasces; eagle standing on British flag.

No. 13. Brigadier-General Miller, for the same.
Obverse: Bust of General Miller.
Reverse: Battle of Chippewa.

No. 14. Brigadier-General Ripley, for the same.
Obverse: Bust of General Ripley.
Reverse: Fame hanging a tablet on palm-tree, bearing inscription: Chippewa, Niagara, and Erie.

No. 15. Major-General Macomb, for Plattsburgh.
Obverse: Bust of General Macomb.
Reverse: Battle of Plattsburgh.

No. 16. Major-General Jackson, for New Orleans.
Obverse: Bust of General Jackson.
Reverse: Figures of Victory and Peace, tablet, &c.

No. 17. Major-General Taylor, for Palo Alto.
Obverse: Bust of General Taylor.
Reverse: Inscription within wreath.

No. 18. Major-General Taylor, for Monterey.
Obverse: Bust of General Taylor.
Reverse: Inscription within wreath.

No. 19. Majot-General Taylor, for Buena Vista.
Obverse: Bust of General Taylor.
Reverse: Battle of Buena Vista.

No. 20. Major-General Scott, for battles in Mexico.
Obverse: Bust of General Scott.
Reverse: Representations of the several engagements during the Mexican campaign at which General Scott commanded.

No. 21. Major-General Grant:
Obverse: Bust of General Grant.
Reverse: Circle formed by Mississippi River monitors and steamboats, the Genius of America descending on a rainbow over Vicksburg and Chattanooga, cornucopia in left hand, shield in right, marked "Donelson," eagle holding up her drapery.

No. 21*a*. Colonel Lee, "Light Horse Harry."
Obverse: Bust of Colonel Lee.
Reverse: Inscription inside wreath.

No. 22. John Paul Jones, for Serapis.
Obverse: Bust of Captain Jones.
Reverse: Engagement between Bonhomme Richard and the Serapis, sailors in water, &c.

No. 23. Capt. Thos. Truxton, action with the frigate L'Insurgente.
Obverse: Bust of Captain Truxton.
Reverse: Engagement between La Vengeance and Constellation.
Note—Captain Truxton captured the French frigate L'Insurgente on the 9th of February, 1800.

No. 24. Captain Hull, for capture of the Guerriere.
Obverse: Bust of Captain Hull.
Reverse: Engagement between the Constitution and the Guerriere.

No. 25. Captain Jacob Jones, for capture of Frolic.
Obverse: Bust of Captain Jones.
Reverse: Engagement between the Wasp and Frolic.

No. 26. Captain Decatur, for capture of the Macedonian.
Obverse: Bust of Captain Decatur.
Reverse: Engagement between the Macedonian and the United States.

No. 27. Captain Bainbridge, for capture of the Java.
Obverse: Bust of Captain Bainbridge.
Reverse: The Java with all her masts gone; the Constitution under full sail.

No. 28. Captain Lawrence, for capture of the Peacock.
Obverse: Bust of Captain Lawrence.
Reverse: Peacock in the act of sinking; a boat from the Hornet is being rowed to her.

No. 29. Captain Burrows, for capture of the Boxer.
Observe: An urn on a tomb surrounded by military emblems; W. Burrows on tomb.
Reverse: Action between Enterprise and Boxer.

No. 30. Lieutenant McCall, for capture of Boxer.
Obverse: Bust of Lieutenant McCall.
Reverse: Action between Enterprise and Boxer.

No. 31. Captain Perry, capture of British fleet on Lake Erie.
Obverse: Bust of Captain Perry.
Reverse: Engagement between American and British fleets.

No. 32. Captain Elliott, for same.
Obverse: Bust of Captain Elliott.
Reverse: Same as Perry medal.

No. 33. Captain Warrington, for capture of the Epervier.
Obverse: Bust of Captain Warrington.
Reverse: Engagement between the Peacock and Epervier.

No. 34. Captain Blakely, for capture of Reindeer.

Obverse: Bust of Captain Blakely.

Reverse: Engagement between the Wasp and Reindeer.

No. 35. Captain Macdonough, capture of British fleet on Lake Champlain.

Obverse: Bust of Captain Macdonough.

Reverse: Engagement between the American and English fleets—sailors in boats—on the right Plattsburg in flames.

No. 36. Captain Henly, for the same.

Obverse: Bust of Captain Henly.

Reverse: Same as Macdonough medal.

No. 37. Lieutenant Cassin, for the same.

Obverse: Bust of Lieutenant Cassin.

Reverse: Same as Macdonough medal.

No. 38. Captain Biddle, for capture of Penguin.

Obverse: Bust of Captain Biddle.

Reverse: Engagement between the Hornet and Penguin.

No. 39. Captain Stewart, for capture of the Cyane and Levant.

Obverse: Bust of Captain Stewart.

Reverse: Engagement between the Constitution and the Cyane and Levant.

No. 39*a*. Captain Edward Preble.

Obverse: Bust of Captain Preble.

Reverse: American fleet before Tripoli.

No. 40. Rescue of officers and crew of brig Somers.

Obverse: Brig Somers capsized.

Reverse: Brig Somers in the distance, capsized; three boats going to her assistance.

No. 41. Captain Ingraham, for rescue of Martin Koszta.

Obverse: Smyrna in the distance; American sloop-of-war St. Louis and Austrian sloop-of-war Hussar confronting each other.

Reverse: Inscription inside wreath.

No. 42. Shipwreck medal.

Obverse: A light-house and sinking ship in the distance; a wrecker has just reached the shore with a shipwrecked person.

Reverse: A spread eagle.

No. 43. United States Coast Survey, for gallantry and humanity.

Obverse: Inscription in wreath.

Reverse: Plain inscription: "The Treasury Department of the U. S. Coast Survey to——."

No. 44. Japanese embassy medal.

Obverse: Head of Buchanan.
Reverse: Inscription in wreath in commemoration.

No. 45. Dr. Frederick Rose, for skill and humanity.

Obverse: Bust of Buchanan.
Reverse: Dr. Rose keeping back death, with scythe and hour glass on the right; patients on the left.

No. 46. Allegiance medal.

Obverse: Bust of Washington.
Reverse: Wreath; inscription: "Oath of allegiance taken by the officers and workmen September 2, 1861."

No. 47. Thomas Jefferson, Presidential or Indian peace medals.

Obverse: Bust of Jefferson.
Reverse: Clasped hands; tomahawk and pipe crossed.

No. 48. James Madison, Presidential.

Obverse: Bust of Madison.
Reverse: Same as Jefferson medal.

No. 49. James Monroe, Presidential.

Obverse: Bust of Monroe.
Reverse: Same as Jefferson medal.

No. 50. John Q. Adams, Presidential.

Obverse: Bust of Adams.
Reverse: Same as Jefferson medal.

No. 51. Andrew Jackson, Presidential.

Obverse: Bust of Jackson.
Reverse: Same as Jefferson medal.

No. 52. Martin Van Buren, Presidential.

Obverse: Bust of Van Buren.
Reverse: Same as Jefferson medal.

No. 53. John Tyler, Presidential.

Obverse: Bust of Tyler.
Reverse: Same as Jefferson medal.

No. 54. James K. Polk, Presidential.

Obverse: Bust of Polk.
Reverse: Same as Jefferson medal.

No. 55. Zachary Taylor, Presidential.

Obverse: Bust of Taylor.
Reverse: Same as Jefferson medal.

No. 56. Millard Fillmore, Presidential.

Obverse: Bust of Fillmore.

Reverse: Farmer and farming implements to left; Indian to right; large American flag in foreground; cattle and vessel in distance.

No. 57. Franklin Pierce, Presidential.

Obverse: Bust of Pierce.

Reverse: Same as Jefferson medal.

No. 58. James Buchanan, Presidential.

Obverse: Bust of Buchanan.

Reverse: Same as Fillmore medal.

No. 59. Abraham Lincoln, Presidential.

Obverse: Bust of Lincoln.

Reverse: Circle formed by two Indians clasping each others topknot; and bow, pipe, and quiver full of arrows; man plowing in fore ground; town in distance.

No. 60. Andrew Johnson, Presidential.

Obverse: Bust of Johnson.

Reverse: Bust of Washington on pedestal; Indian clasping hands with Goddess of Liberty with flag in her left hand; railroad to right, buffaloes to left.

No. 61. ———

No. 62. Captain Perry (State of Pennsylvania), for capture of British fleet on Lake Erie.

Obverse: Bust of Captain Perry.

Reverse: The engagement on Lake Erie; Perry passing to the Niagara in small boat; eagle over the Niagara with scroll in its mouth bearing the word "victory."

No. 63. Pennsylvania Volunteers, action on Lake Erie.

Obverse: Bust of Perry.

Reverse: Wreath; to— —in testimony of his patriotism and bravery, &c., on Lake Erie.

No. 64. Major-General Scott (Commonwealth of Virginia.)

Obverse: Bust of General Scott resting on a pedestal, supported on each side by an eagle; cannon, colors, &c., to right and left.

Reverse: Column on two stands of colors, with eagle on top of column; troop to right and left; City of Mexico and fort in distance.

No. 64*a*. Professor Agassiz medal.

Obverse: Bust of Professor Agassiz.

Reverse: Wreath with date of birth and death inside; inverted torches.

No. 65. Colonel Armstrong, for destruction of Indian village of Kittaning.

Obverse: An officer, with two men, pointing to a third who is shooting an Indian from behind a tree; burning village in background.
Reverse: Coat of arms of Philadelphia.

No. 66. Indian peace medal.

Obverse: Bust of George II, King of England.
Reverse: A white man and Indian sitting beside a fire under a tree; white man handing Indian a pipe.

No. 67. Captains Creighton, Low, and Stouffer; wreck of steamer San Francisco.

Obverse: Coat of arms of Philadelphia.
Reverse: No device; inscription.

No. 67*a*. Captains Creighton, Low, and Stouffer, by Congress.

Obverse: America crowning a sailor with a laurel wreath; quadrant in sailor's right hand; eagle at feet of America and standing on Roman fasces and shield; Capitol in background; ship in distance.
Reverse: Man and woman on a raft; ship in the distance.

No. 67*b*. Cornelius Vanderbilt.

Obverse: Bust of Vanderbilt.
Reverse: The genius of commerce presenting a ship to armed America ship in the distance.

No. 68. Dr. Hosack.

Obverse: Bust of Dr. Hosack.
Reverse: The insignia of arts and science.

No. 69. First steam coinage.

Reverse: Liberty cap in circle formed by rays.
Obverse: Inscription: First steam coinage.

No. 70. Commodore M. C. Perry, from merchants of Boston.

Obverse: Bust of Commodore Perry.
Reverse: Inscription in wreath of oak and laurel leaves.

No. 71. Pacific Railroad medal.

Obverse: Bust of President Grant.
Reverse: Atlantic and Pacific Oceans; mountains in the background; train of cars crossing plains in foreground.

No. 72. Emancipation Proclamation medal.

Obverse: Bust of President Lincoln.
Reverse: Inscription: "Emancipation proclaimed, January 1, 1863."

No. 73. Cyrus W. Field—Atlantic cable.

Obverse: Bust of Field; ocean; ships paying out cable in opposite directions; half globe on right and left; hand above Field's head holding wreath.

Reverse: Inscription; shield to left; star to right; globe at bottom oak and laurel leaves.

No. 74. Dr. Joseph Pancoast.

Obverse: Bust of Pancoast.

Reverse: Wreath of oak and laurel leaves; inscription.

No. 75. Grant's Indian peace medal.

Obverse: Bust of Grant; pipe and twig of laurel; inscription.

Reverse: Open Bible on top of globe, which is resting on farming implements.

No. 76. Let us have peace.

Obverse: Bust of Grant.

Reverse: Inscription: "Let us have peace."

No. 76*a*. Seward-Robinson medal.

Obverse: Bust of Robinson.

Reverse: Seward lying in bed; Robinson struggling with Paine, who has a dirk in his right hand; pistol lying on the floor.

No. 76*b*. Metis (shipwreck) medal.

Obverse: Boat with crew, one of whom is standing up with a coil of rope on his arm, and is pointing to the sinking steamer Metis; a second has his arms around a drifting woman, and is lifting her into the boat; life-saving station in the distance.

Reverse: Inscription; to ———, for courage and humanity, &c.

No. 76*c*. John Horn (life-saving) medal.

Obverse: Bust of John Horn.

Reverse: Laurel wreath with inscription.

No. 76*d*. United States Diplomatic medal, July 4, 1776.

Obverse: Mercury inviting America to peace and commerce; bales of cotton and emblems of commerce to left; ship to the right.

Reverse: First arms of the United States.

No. 77. Presidency relinquished.

Obverse: Bust of Washington.

Reverse: Pedestal with United States shield on side; on top a sword and fasces encircled with laurels.

No. 78. Cabinet medal.

Obverse: Bust of Washington.

Reverse: Pedestal, filled with Washington medals, surmounted with bust of Washington.

No. 79. Time increases his fame.
Obverse: Bust of Washington.
Reverse: Inscription: "Time increases his fame."

No. 80. Commencement of Cabinet.
Obverse: Bust of Washington.
Reverse: Inscription: "A memorial of the Washington Cabinet, May, 1859."

No. 81. David Rittenhouse, Director.
Obverse: Bust of Rittenhouse.
Reverse: Inscription: "He belongs to the whole human race."

No. 82. I. R. Snowden, Director.
Obverse: Bust of Snowden.
Reverse: The Mint building.

No. 83. Ex-Governor James Pollock, Director.
Obverse: Bust of Pollock.
Reverse: Inscription: "Governor of Pennsylvania, Director of the Mint," &c.

SILVER MEDALETS.

Washington and Jackson, heads of both.
Washington and Lincoln, heads of both.
Washington and Grant, heads of both.
Washington and wreath, date of birth and death.
Lincoln and Grant.
Lincoln and broken column.

BUREAU OF ENGRAVING AND PRINTING.

BUREAU OF ENGRAVING AND PRINTING.

ORGANIZATION AND HISTORY OF THE BUREAU.

During the administration of Mr. Secretary Chase, in February, 1862, the first step was made toward the organization of this Bureau. The public issues at that time were printed by private corporations in New York City, and from there forwarded to Washington for signature by the proper officers. This mode of preparing the public securities was soon found to be impracticable as well as insecure, and the Secretary was authorized by Congress to have the seal of the Treasury Department, together with the engraved signatures of the Treasurer of the United States and the Register of the Treasury imprinted thereon, under his immediate supervision, in the Treasury Department, and a sum sufficient to procure the necessary machinery was appropriated.

Mr. Spencer M. Clark, of Connecticut, was placed in charge, and under his management the organization of the Bureau was carried forward; and as the needs of the public service became manifest inventions were made which enabled much of the work to be done in a more economical and rapid manner.

Urged by the considerations of security and economy, in June, 1862, the requisite authority was given by Congress to have the entire mechanical work upon the public securities done under official oversight, and since that time a very large portion of the work on these securities has been done in the Bureau of Engraving and Printing in the Treasury Department.

Mr. George B. McCartee, of New York, in 1869, succeeded Mr. Clark, and continued in charge of the Bureau until February, 1876, when Mr. Henry C. Jewell, the present incumbent, was appointed chief.

CATALOGUE OF EXHIBITS AT INTERNATIONAL EXHIBITION, 1876.

Exhibit No. 1.—The large frame to the right on entering contained proof specimens of various public securities, checks, &c., which had been entirely prepared in the Bureau. In the center of the frame was placed the medal awarded to the Bureau by the Emperor of Austria-Hungary for the excellence of the engravings exhibited by it at the International Exposition in Vienna in 1873.

Exhibit No. 2.—The large frame to the left contained a proof-copy of the Centennial certificate of stock; also specimens of lettering produced by a process invented by Mr. G. W. Casilear of the Bureau. The peculiarity of the process is, that after an alphabet of any kind has been once engraved and properly transferred in relief upon rolls the letters can be indefinitely reproduced by pressure upon steel plates, and in a much shorter time than by the process of successively engraving them.

Exhibit No. 3.—The frame in the center contained proof-specimens of various Government issues, and a proof of the $10,000 United States funded loan bond, with coupons and other engraved work; also portraits and vignettes.

Exhibit No. 4.—The frame at the right end contained various vignettes and portraits of public men, with proof-specimens of bank notes, &c. This frame was exhibited at the Exposition in Vienna in 1873, and the medal above mentioned was awarded therefor.

Exhibit No. 5.—The frame at the left end contained specimens of the distinctive paper manufactured under the supervision of the United States Government at Glen Mills, Pennsylvania, by Messrs. James M. Willcox & Co., and which is used solely for the public securities; also impressions of one dollar United States notes, showing in detail the successive printings, &c., which, combined, make the perfect note.

SUPERVISING ARCHITECT.

SUPERVISING ARCHITECT

HISTORICAL SKETCH OF THE OFFICE OF THE SUPERVISING ARCHITECT, TREASURY DEPARTMENT.

This office was organized in the spring of 1853, under the direction of James Guthrie, the then Secretary of the Treasury, under the title of the "Construction branch of the Treasury Department." Prior to this time the Secretary of the Treasury was charged by law with the construction of all the custom-houses, marine hospitals, branch mints, assay offices, appraisers' stores, and court-houses, and almost everything, but the amount of the appropriation was left to his discretion. No system had been devised for the performance of these duties, and the management of the business was confided to no particular branch of the Department. An architect, Ammi B. Young, was employed at a salary of $3,000 per annum, with traveling expenses allowed when absent inspecting works, &c. He was paid out of the several appropriations, according to the time given to each work. The buildings were generally constructed under the supervision of a local commission appointed by the Secretary of the Treasury with local architects and superintendents, who were paid out of the appropriations. No system of keeping or rendering accounts of the respective works at the buildings or in the Department had been adopted. The plans were obtained through competition, and the successful architect was generally appointed superintendent. At this time the United States owned but twenty-three custom-houses and eighteen marine hospitals, completed and occupied, and fifteen custom-houses were in course of construction. Most of the buildings occupied had been purchased.

With a view to a more efficient management application was made by Secretary Guthrie to the Secretary of War to detail an engineer officer to take charge of this branch of the service, and Capt. Alexander H. Bowman, of the Engineer Corps of the United States Army, was detailed and assigned to duty as engineer in charge of the Bureau of Construction. For these services he was allowed a compensation of $8 per diem (less his pay as captain) and his traveling expenses while inspecting buildings. Mr. Young was also retained as supervising architect to aid Captain Bowman in his particular branch of work. Captain Bowman, on assuming charge of the office, prescribed certain regulations for the Government of the employés, both at the department and on the different works, and devised certain forms of vouchers, accounts current, abstracts of disbursements, reports, returns, &c., all of which were submitted to the Secretary of the Treasury, and, receiving his approval, were adopted. These regulations and forms are still in force, with such modifications and variations as the growth of the business and changes of system in the expenditures have necessitated. Under this new form plans for public buildings were prepared in the Bureau of Construction and reproduced by the lithographic process, and the lithographic copies were furnished to contractors and builders, upon which they submitted estimates and obtained contracts.

Captain Bowman continued in charge until the fall of 1860, when he was relieved from duty, and S. M. Clark assumed the duties as acting engineer in charge. This arrangement continued until July 28, 1862, when Isaiah Rogers assumed charge of the office as Supervising Architect, and the designation of the office was then changed to that of "Office of Supervising Architect, Treasury Department."

In 1864 Congress recognized the office and made specific appropriations for its officers. Mr. Rogers held the position until September 30, 1865, and during his administration the use of photography was applied to the reproduction of the plans, and a building for photographic purposes was erected south of the Treasury.

On October 1, 1865, Alfred B. Mullett was placed in charge as acting Supervising Architect, and on June 1, 1866, he was appointed Supervising Architect. Mr. Mullett held the office until January 1, 1875, when he was succeeded by William A. Potter, who in turn was succeeded by the present Supervising Architect, James G. Hill, who assumed the duties of the office August 11, 1876.

The increase of the work of the office is shown by a comparison of the number of buildings of the character hereinbefore indicated owned by the United States or in course of construction, with their total cost, on June 30, 1853, and the number and cost of such buildings June 30, 1876.

The total number of buildings owned or in course of construction June 30, 1853, was 56, and their cost was $8,877,350.88. The number owned or in course of construction June 30, 1876, was 159, and their cost was $62,594,539.26. The annual expenditures for the first six years after the organization of the office averaged $2,000,000; the expenditures for the past six years averaged $7,000,000.

Of the 56 buildings owned or in course of construction in 1853, 15 have been sold or disposed of.

At present the office is charged with the following duties: Selecting and purchasing sites for all public buildings under the Treasury Department, including custom-houses, appraisers' stores, court-houses, post-offices, mint buildings, assay offices, and marine hospitals; making designs for these buildings and preparing plans, specifications, estimates, schedules, detailed working drawings, models, &c., therefor;

constructing the buildings and supplying furniture, heating, hoisting, and ventilating apparatus, vaults, safes, locks, fuel, light, water, and such miscellaneous articles as may be required for all public buildings in charge of the Department, and performing all work necessary for their repair and preservation. It has also to prepare all contracts for the supply of materials or labor required in connection with the above duties. It is also charged with the leasing of all buildings rented for the public service under the Department, and with the custody of the leases and deeds, and all bonds of superintendents of construction or repair of public buildings. The office is required to exercise supervision over the public property in owned and rented buildings under the control of the Department, and to keep a record thereof. It is also required to give to accounts of disbursing agents for the several works hereinbefore specified the administrative scrutiny required by law before they are forwarded to the proper accounting officers for adjustment.

Catalogue of articles exhibited by the office of the Supervising Architect, Treasury Department, at the international exhibition at Philadelphia, 1876.

LARGE PERSPECTIVES.

Atlanta, Ga., court-house and post-office.
Cincinnati, Ohio., custom-house, &c.
Covington, Ky., court-house and post-office.
Evansville, Ind., custom-house, &c.
Fall River, Mass., custom-house, &c.
Nashville, Tenn., custom-house, &c.
Philadelphia, Pa., court-house and post-office.

SMALL PERSPECTIVES (LINE DRAWINGS).

Albany, N. Y., custom-house, &c.
Auburn, N. Y., public building.
Boston, Mass., post-office and sub-treasury extension.
Memphis, Tenn., custom-house, &c.

SMALL PERSPECTIVES (PHOTOGRAPHS.)

Bangor, Me., custom-house, &c.
Boise City, Idaho, assay office.
Boston, Mass., post-office and sub-treasury.
Cairo, Ill., custom-house, &c.
Carson City, Nev., mint building.
Chicago, Ill., custom-house, &c.
Chicago, Ill., modification of above.
Chicago, Ill., marine hospital.
Des Moines, Iowa, court-house and post-office.

Dover, Del., court-house and post-office.
Grand Rapids, Mich., court-house and post-office.
Hartford, Conn., custom-house, &c.
Helena, Mont., assay office.
Little Rock, Ark., court-house and post-office.
Madison, Wis., court-house and post-office.
New York City, court-house and post-office.
Ogdensburg, N. Y., custom-house, &c.
Parkersburg, W. Va., court-house and post-office.
Philadelphia, Pa., appraisers' stores.
Port Huron, Mich., custom-house, &c.
Portland, Me., court-house and post-office.
Portland, Me., custom-house.
Portland, Oreg., custom-house, &c.
Saint Louis, Mo., custom-house, &c.
Saint Paul, Minn., custom-house, &c.
Springfield, Ill., court-house and post-office.
Trenton, N. J., court-house and post-office.
Washington, D. C., new State, War, and Navy Departments.
Washington, D. C., new jail.

MISCELLANEOUS.

One plaster model of the United States custom-house at Nashville, Tenn.

Three tracings, three negatives, and three photographs, showing method of reproducing plans by photography.

SUPERVISING ARCHITECT'S OFFICE,
Treasury Department, January 3, 1877.

INTERNAL REVENUE.

INTERNAL REVENUE.

The system of internal revenue now in force was inaugurated a little over one year after the outbreak of the rebellion, under the act approved July 1, 1862, entitled "An act to provide internal revenue to support the Government and to pay interest on the public debt."

The following table shows the names, &c., of the several Commissioners of Internal Revenue from 1862 to 1876:

Names.	Whence appointed.	Date of appointment.	Date of retirement.
George S. Boutwell	Massachusetts	July 17, 1862	Mar. 3, 1863
Joseph J. Lewis	Pennsylvania	Mar. 4, 1863	June 30, 1865
William Orton	New York	July 1, 1865	Oct. 31, 1865
E. A. Rollins	New Hampshire	Nov. 1, 1865	Mar. 10, 1869
Columbus Delano	Ohio	Mar. 11, 1869	Oct. 31, 1870
J. W Douglass *	Pennsylvania	Nov. 1, 1870	Jan. 2, 1871
Alfred Pleasonton	New York	Jan. 3, 1871	Aug. 8, 1871
J. W. Douglass *	Pennsylvania	Aug. 8, 1871	Dec. 11, 1871
J. W. Douglass	do	Dec. 12, 1871	May 14, 1875
D. D. Pratt	Indiana	May 15, 1875	July 31, 1876
Green B. Raum	Illinois	Aug. 1, 1876	....

* Acting Commissioner.

At first the taxes it imposed were comparatively light. As the demands of the Government for increased revenues, however, became more urgent, in consequence of the magnitude and long continuance of the war, it was gradually enlarged by successive enactments, in 1863, 1864, and 1865, until it levied heavy taxes upon raw products; upon every branch of manufacturing industry; upon nearly all professions, trades, and occupations; upon the entire receipts of transportation and other companies, of lotteries and places of amusement; upon articles of luxury kept for use; upon legal instruments of nearly every kind; upon incomes, sales, proprietary medicines, &c.; upon legacies and successions; and upon the capital, circulation, and deposits of banks. In a word, every available source of revenue was laid under contribution to furnish means to support the Government in its struggle for existence. This system was probably more far-reaching and comprehensive than any ever before devised.

About the middle of the year 1866 the work of reducing internal taxation commenced, and went on more or less rapidly every year until 1872, when, according to carefully prepared estimates, taxes amounting to over two hundred and sixty-two millions of dollars per annum had been repealed, and the system relieved of its most burdensome provisions.

The articles now on the tax-list are few in number, and are mostly limited to what are usually denominated articles of luxury. They include spirituous and fermented liquors; manufactured tobacco of every description, domestic and imported; occupations relating to the manufacture and sale of the aforesaid articles; proprietary medicines, perfumery, cosmetics, friction-matches, and bank checks, and the capital, circulation, and deposits of all banks and bankers not national.

The total amount of internal revenue collected and deposited in the Treasury of the United States under this system prior to June 30, 1876, exclusive of drawbacks ($6,673,845) and of sums refunded ($6,467,27.210), as illegally collected, was $2,169,890,833.81.

INVENTORY OF ARTICLES ON EXHIBITION BY THE INTERNAL REVENUE OFFICE, TREASURY DEPARTMENT.

No. 1. One very large frame containing specimens of documentary, general proprietary, and private die proprietary stamps of all denominations from one cent to five thousand dollars each. Printed by J. R. Carpenter, Philadelphia.

No. 2. One large frame in three sections; the first containing specimens of documentary stamps, of the denomination of two cents only; also general proprietary, private die proprietary, tobacco, snuff, and fermented liquor stamps, and exportation stamps for distilled spirits, tobacco and snuff, and cigars. Printed by the National Bank Note Company of New York. The second section contains specimens of stamps for distilled spirits, cigars and cigarettes. Printed by the American Bank Note Company of New York. And the third section contains specimens of stamps for tobacco, snuff, and cigars, also exportation tobacco stamps. Printed by the Continental Bank Note Company of New York.

No. 3. One large frame containing specimen stamps for distilled spirits, fermented liquors, tobacco, snuff and cigars; also special tax stamps, brewers' permits, hydrometer certificates, and lock seals. Printed by the Bureau of Engraving and Printing, Treasury Department.

No. 4. One large frame containing specimens of stamps for distilled spirits, tobacco, snuff, and cigars, and special tax stamps. This also was printed by the Bureau of Engraving and Printing, Treasury Department. One large glass show-case containing four complete gauging rods, used for ascertaining the capacity of whisky packages; two full and complete sets of hydrometers, used for ascertaining the temperature and strength of distilled spirits; two Slaight seal locks, one brass and the other nickel plated, together with paper seals, used upon the doors of distillery warehouses and cistern rooms; two D. K. Miller locks, one brass and the other nickel plated, used upon various points throughout distilleries; fourteen empty whisky and beer casks; all sizes, showing the manner in which stamps are required to be placed thereon; twelve empty tobacco boxes and six empty cigar boxes, showing the manner in which stamps are required to be placed thereon; four dozen packages of smoking tobacco of various kinds; nine packages of Century chewing tobacco; three jars of snuff and three bladders of snuff, all with stamps placed thereon, showing the manner in which they are required by law to be affixed.

INTERNATIONAL EXHIBITION OF 1876.

CATALOGUE OF THE ARTICLES AND OBJECTS

EXHIBITED BY THE

POST-OFFICE DEPARTMENT

OF THE

UNITED STATES

IN THE

UNITED STATES GOVERNMENT BUILDING,

FAIRMOUNT PARK, PHILADELPHIA, PA.,

PRECEDED BY

A BRIEF HISTORY OF THE DEPARTMENT AND AN OUTLINE
OF ITS PRESENT ORGANIZATION;

TO WHICH IS ADDED

AN APPENDIX.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1883.

HON. JAMES N. TYNER,
Postmaster-General.

DR. C. F. MACDONALD,
Superintendent money-order system, Representative of the Post-Office Department at the International Exhibition of 1876.

LIST OF THE OFFICERS OF THE POST-OFFICE DEPARTMENT ATTACHED TO THE POST-OFFICE SECTION OF THE INTERNATIONAL EXHIBITION OF 1876, *AT THE UNITED STATES GOVERNMENT BUILDING, FAIRMOUNT PARK, PHILADELPHIA, PA.*

M. LA RUE HARRISON,
Special agent of the money-order system, assistant to the Representative of the Post-Office Department, in charge of post-office section of International Exhibition, 1876.

JOHN JAMESON,
Assistant general superintendent railway mail service, in charge of mailing division and Centennial railway post-office.

CENTENNIAL BRANCH POST-OFFICE, PHILADELPHIA, PA.

GEORGE W. FAIRMAN,
Postmaster.

H. H. WOLLE,
Superintendent, in charge.

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THE POST-OFFICE DEPARTMENT.

I.—*CONDENSED CHRONOLOGICAL HISTORY OF THE POST-OFFICE DEPARTMENT.*

There were no mails in the colonies prior to 1672. In that year the government of New York established a monthly mail to Boston.

1680. John Haywood was appointed the first postmaster in Massachusetts.

1683. William Penn established post-offices in Pennsylvania.

1702. A second monthly mail between New York and Boston was started.

1737. Benjamin Franklin was appointed postmaster at Philadelphia.

1753. Delivery of letters by penny-post was begun.

1754. A weekly mail from Philadelphia to New England was commenced.

1765. Mails conveyed in covered New Jersey wagons (without springs) semi-weekly between New York and Philadelphia. Time, three days.

1774. Benjamin Franklin, postmaster, removed by Home Department.

1775, July 26. Congress assumed direction of the post-offices, and appointed Benjamin Franklin Postmaster-General.

1775, November. Richard Bache, of Philadelphia, son-in-law of Benjamin Franklin, was appointed Postmaster-General.

1789, September 26. Samuel Osgood, of Massachusetts, appointed Postmaster-General. He had one Assistant Postmaster-General and one clerk. The number of post-offices was 75.

1791. Timothy Pickering, of Pennsylvania, appointed Postmaster-General August 12.

1793. Penny-post of Philadelphia employed three carriers, New York one carrier. Letters delivered at 2 cents each.

1795. Joseph Habersham, of Georgia, appointed Postmaster-General February 25.

1798. Transit time between Philadelphia and New York seventeen hours.

1799. United States mail-stage line between Philadelphia and Baltimore put in operation. Time between New York and Boston four days and five hours.

1800. General Post-Office moved to Washington.

1801. Gideon Granger, of New York, appointed Postmaster-General.

1810. Number of post-offices, 2,300.

1814. Return J. Meigs, of Ohio, appointed Postmaster-General.

1815. February 1, to March 31, 1816, 50 per cent. added to all postage for the purpose of raising revenues to meet war expenses.

1823. John McLean, of Ohio, appointed Postmaster-General, March 9.

1835. Amos Kendall, of Kentucky, appointed Postmaster-General March 1.

1836. General Post-Office building destroyed by fire.

1840, March 25. John M. Niles, of Connecticut, appointed Postmaster-General.

1841, September 3. Charles A. Wickliffe, of Kentucky, appointed Postmaster-General.

1845, March 5. Cave Johnson, of Tennessee, appointed Postmaster-General.

1849, March 7. Jacob Collamer, of Vermont, appointed Postmaster-General.

1850, July 20. Nathan K. Hall, of New York, appointed Postmaster-General.

1852, August 31. J. D. Hubbard, of Connecticut, appointed Postmaster-General.

1853, March 5. James Campbell, of Pennsylvania, appointed Postmaster-General.

1857, March 6. Aaron V. Brown, of Tennessee, appointed Postmaster-General.

1859, March 4. Joseph Holt, of Kentucky, appointed Postmaster-General.

1861, January 1. Horatio King, of Maine, appointed Postmaster-General.

1861, March 7. Montgomery Blair, of Maryland, appointed Postmaster-General.

1864, October 1 William Dennison, of Ohio, appointed Postmaster-General.

1866, July 15. Alexander W. Randall, of Wisconsin, appointed Postmaster-General.

1869, March 4. John A. J. Creswell, of Maryland, appointed Postmaster-General.

1874, July 6. James W. Marshall, of Virginia, appointed Postmaster-General.

1874, September 1. Marshall Jewell, of Connecticut, appointed Postmaster-General.

1876, July 13. James N. Tyner, of Indiana, appointed Postmaster-General.

II.—*REVENUES AND EXPENDITURES OF THE POST-OFFICE DEPARTMENT.*

Years.	Number of post-offices.	Revenues.	Expenditures.
1789	75	$30,000	$33,500
1795	455	160,619	117,893
1800	903	280,804	213,994
1805		421,372	377,367
1815	3,000	1,043,065	748,128
1820		1,196,527	1,160,926
1825	5,677	1,306,525	1,229,043
1830	8,450	1,850,583	1,932,708
1835	10,770	2,993,356	2,757,350
1840	13,488	4,536,265	4,759,110
1845	14,183	1,289,841	4,320,731
1850	18,417	5,552,971	5,212,953
1856	25,565	7,620,821	10,405,286
1860	28,498	8,518,067	14,874,772
1865	28,882	14,556,158	13,694,728
1870	28,492	19,772,220	23,998,837
1871	30,045	20,037,045	24,390,104
1875	35,734	26,671,218	33,611,309

III.—*HISTORICAL SCHEDULE OF CHANGES OF RATES OF POSTAGE ON LETTERS PASSING BETWEEN POST-OFFICES IN THE UNITED STATES.*

1683.

	s.	*d.*
From "The Falls" to Philadelphia	0	3
From "The Falls" to Chester		5
From "The Falls" to New Castle		7
From "The Falls" to Maryland		9
From Philadelphia to Chester		2
From Philadelphia to New Castle		4
From Philadelphia to Maryland		6

1692.

By act of Virginia assembly:

Within 80 miles	3
Exceeding 80 miles	4½

1693.

By act of Pennsylvania assembly:

Single letters, within 80 miles:

From Philadelphia to Delaware, Maryland, and Virginia	9
From Philadelphia to Boston and New England	19

1697.

From New York to Philadelphia	4½
From Philadelphia to Connecticut	9
From Philadelphia to Rhode Island	12
From Philadelphia to Boston	15

1710.

	s.	d.
Rate of postage by act of Parliament:		
To and from New York:		
Within 60 miles		4
Within 60 miles, double		8
Within 60 miles, treble	1	0
Within 60 miles, ounce	1	4
Exceeding 100 miles		6
From New York to—		
Philadelphia		9
Rhode Island, Massachusetts, New Hampshire, and Maryland	1	0
Virginia	1	3
Charleston	1	6

1775.

Single letters:		
Not exceeding 60 miles		5¼
Exceeding 60, not exceeding 100 miles		8
Exceeding 100, not exceeding 200 miles		10¼
Exceeding 200, not exceeding 300 miles	1	1
Exceeding 300, not exceeding 400 miles	1	4
Exceeding 400, not exceeding 500 miles	1	6¼
Exceeding 500, not exceeding 600 miles	1	9
Exceeding 600, not exceeding 700 miles	2	0
Exceeding 700, not exceeding 800 miles	2	2¼
Exceeding 800, not exceeding 900 miles	2	5
Exceeding 900, not exceeding 1,000 miles	2	8

Every ounce charged four times the single rate.

1775.

Rates for single sheets, established by Congress:

	Cents.
Not exceeding 60 miles	7⅖
Over 60, not exceeding 100 miles	11

1792.

February 2:	
Not exceeding 30 miles	6
Exceeding 30, not exceeding 60 miles	8
Exceeding 60, not exceeding 100 miles	10
Exceeding 100, not exceeding 150 miles	12½
Exceeding 150, not exceeding 200 miles	15
Exceeding 200, not exceeding 250 miles	17
Exceeding 250, not exceeding 350 miles	20
Exceeding 350, not exceeding 450 miles	22
Exceeding 450 miles	25

1816.

Not exceeding 30 miles	**6**
Exceeding 30, not exceeding 80 miles	**10**
Exceeding 80, not exceeding 150 miles	**12½**
Exceeding 150, not exceeding 400 miles	**18¾**
Exceeding 400 miles	**25**

1846.

March 3:	Cents.
Not exceeding 300 miles	5
Exceeding 300 miles	10

1855.

March 3:	
Not exceeding 3,000 miles	3
Exceeding 3,000 miles	10

1856.

June 1, prepayment by stamps made compulsory.

1863.

March 3, and —, uniform rate of postage without regard to distance, fixed at 3 cents.

IV.—*PRESENT ORGANIZATION OF THE POST-OFFICE DEPARTMENT.*

JAMES N. TYNER, Indiana, *Postmaster-General.*

WILLIAM A. KNAPP, Ohio, *Chief Clerk.*

The direction and management of the Post Office Department are assigned by the Constitution to the Postmaster-General. That the business thereof may be the more conveniently arranged and prepared for his final action, it is distributed among several bureaus, as follows:

OFFICE OF THE FIRST ASSISTANT POSTMASTER-GENERAL.

JAMES W. MARSHALL, Virginia, *First Assistant Postmaster-General.*

JAMES H. MARR, Maryland, *Chief Clerk.*

Including the divisions of free delivery, blank agency, appointment, bond, and of salaries and allowances.

FREE DELIVERY.

REVERE W. GURLEY, Louisiana, *Superintendent.*

To this division are assigned the duty of preparing cases for the inauguration of the system of cities, the appointment of letter-carriers, the regulation of allowances for incidental expenses, and the general supervision of the system throughout the United States.

BLANK AGENCY.

NICHOLAS A. GRAY, Ohio, *Superintendent.*

To this division is assigned the duty of sending out blanks, wrapping-paper, and twine, and also letter-balances and canceling stamps to offices entitled to the same.

APPOINTMENT DIVISION.

THOMAS E. ROACH, Delaware, *Principal Clerk.*

To this division is assigned the duty of preparing all cases for the establishment, discontinuance, and change of name or site of post-offices, and for the appointment of all postmasters, special, route, and local agents, railway postal clerks, mail-route messengers, and Department employés, and of attending to all correspondence consequent thereto.

BOND DIVISION.

CHAUNCEY SMITH, Vermont, *Clerk in charge.*

To this division is assigned the duty of receiving and recording appointments, sending out papers for postmasters and their assistants to qualify, receiving, entering, and filing their bonds and oaths, and issuing the commissions of postmasters.

SALARY AND ALLOWANCE DIVISION.

——— ———, *Clerk in charge.*

To this division are assigned the duty of readjusting the salaries of postmasters and the consideration of allowances for rent, fuel, and lights, clerk hire, and miscellaneous expenditures.

OFFICE OF THE SECOND ASSISTANT POSTMASTER GENERAL.

THOMAS J. BRADY, Indiana, *Second Assistant Postmaster-General.*

JOHN L. FRENCH, *Chief Clerk.*

Including the divisions of contracts, railway classification, railway mail service, inspection, and mail equipments.

CONTRACT DIVISION.

To this division is assigned the business of arranging the mail service of the United States, and of placing the same under contract, embracing all correspondence and proceedings respecting the frequency of trips, mode of conveyance, and times of departures and arrivals on all the routes; it has charge of the course of the mails between the different sections of the country, the points of mail distribution, and the regulations for the government of the domestic mail service of the United States. It prepares the advertisements for mail proposals, receives the bids, and has charge of the annual and occasional mail lettings, and the adjustment and execution of the contracts. All changes in mail service and mail arrangements and in mail messengers are made through this office, and all claims for transportation service are adjusted by it. From this office all postmasters at the ends of routes receive the statement of mail arrangements prescribed for the respective routes. It reports weekly to the Auditor all contracts executed, and all orders affecting the accounts for mail transportation; prepares the statistical exhibits of the mail service, and the reports to Congress of the mail lettings, giving a statement of each bid; also of the contracts made, the new service originated, the curtailments ordered, and the additional allowances granted within the year.

DIVISION OF RAILWAY CLASSIFICATION.

JAMES N. DAVIS, Maryland, *Superintendent.*

This division has charge of the classification of railroad routes and the adjustment of the rates of pay for the transportation of mails thereon, according to the amount and character of the service.

RAILWAY MAIL SERVICE.

THEODORE N. VAIL, Iowa, *Superintendent.*

MILO V. BAILEY, New York, *Chief Clerk.*

To this division is assigned the general supervision of the railway post-office clerks, route agents, mail-route messengers, and local mail agents; also the distribution and dispatch of mails in all post-offices and on railroad and steamboat routes. All delays or irregularities in the delivery and transmission of mails on railroads are reported to this office. Wooden or card labels, for pouches and sacks, are furnished by this office.

INSPECTION DIVISION.

SAMUEL M. LAKE, Illinois, *Clerk in charge.*

To this division is assigned the duty of receiving and examining the registers of the arrivals and departures of mails, the certificates of the service of route agents, and the reports of mail failures; of noting the delinquencies of contractors, and preparing cases thereon for the action of the Postmaster-General; of furnishing blanks for mail registers and reports of mail failures, and such other duties as may be necessary to secure a faithful and exact performance of all mail contracts and service.

MAIL EQUIPMENT DIVISION.

HENRY L. JOHNSON, District of Columbia. *Clerk in charge.*

To this division is assigned the issuing of mail locks and keys, mail pouches and sacks, and the construction of mail-bag catchers.

OFFICE OF THE THIRD ASSISTANT POSTMASTER-GENERAL.

Edward W. Barber, Michigan, *Third Assistant Postmaster-General.*

William M. Morton, New York, *Chief Clerk.*

Including the divisions of finance, of postage-stamps, stamped envelopes and postal cards, of registered letters, of dead letters, and of files, records, and mails.

DIVISION OF FINANCE.

Hannibal D. Norton, *Clerk in charge.*

To this division are assigned the duty of issuing drafts and warrants in payment of balances reported by the Auditor to be due to mail contractors or other persons; the superintendence of the collection of revenue at depository, draft, and depositing offices, and the keeping of the accounts between the Department and the Treasurer and assistant treasurers and designated depositories of the United States. This division receives all accounts, monthly or quarterly, of the depository and draft offices, and certificates of deposit from depositing offices.

DIVISION OF POSTAGE-STAMPS AND STAMPED ENVELOPES AND POSTAL CARDS.

Abraham D. Hazen, Pennsylvania, *Chief of Division.*

To this division is assigned the issuing of postage-stamps, stamped envelopes, newspaper wrappers, and postal cards; also the supplying of postmasters with envelopes for their official use and registered package envelopes and seals.

DIVISION OF REGISTERED LETTERS.

Samuel S. Stratton, Pennsylvania, *Clerk in charge.*

To this division is assigned the duty of preparing instructions for the guidance of postmasters relative to registered letters, and all correspondence connected therewith; also the compilation of statistics as to the transactions of the business.

DIVISION OF DEAD LETTERS.

Everett J. Dallas, Kansas, *Chief of Division.*

To this division is assigned the examination and return to the writers of dead letters, and all correspondence relating thereto.

DIVISION OF FILES, RECORDS, AND MAILS.

Evelyn S. Hall, Vermont, *Clerk in charge.*

MONEY-ORDER OFFICE.

CHARLES F. MACDONALD, Massachusetts, *Superintendent.*

DAVID HAYNES, Pennsylvania, *Chief Clerk.*

To this office are assigned the general supervision and control of the postal money-order system throughout the United States, and the supervision of the international money-order correspondence with foreign countries.

OFFICE OF FOREIGN MAILS.

JOSEPH H. BLACKFAN, New Jersey, *Superintendent.*

JAMES S. CRAWFORD, Maryland, *Chief Clerk.*

To this office are assigned all foreign postal arrangements, and the supervision of the ocean mail-steamship service.

TOPOGRAPHER'S OFFICE.

WALTER L. NICHOLSON, District of Columbia, *Topographer, Post-Office Department.*

CHARLES H. POOL, *Principal assistant.*

This office is charged with keeping up the maps in use by the officers and clerks of the various bureaus; with the preparation and publication of new post route maps and revised editions of others; and with furnishing maps, where necessary, to postmasters and other persons in the postal service.

OFFICE OF SPECIAL AGENTS AND MAIL DEPREDATIONS.

CHARLES COCHRAN, Jr., Maryland, *Superintendent.*

All cases of mail depredation, or violation of law by private expresses, or by the forging or illegal use of postage-stamps, are under the supervision of this office. Special agents of the Department make their reports to this office, and to it all their accounts for compensation and expenses are transmitted for examination and presentation to the Postmaster-General for allowance.

ASSISTANT ATTORNEY GENERAL FOR THE POST OFFICE DEPARTMENT.

THOMAS A. SPENCE, Maryland.

OFFICE OF THE AUDITOR OF THE TREASURY FOR THE POST-OFFICE DEPARTMENT.

J. MILTON MCGREW, Ohio, *Sixth Auditor of the Treasury.*

F. B. LILLEY, New York, *Deputy Auditor.*

This is a bureau of the Treasury Department, which, for convenience, is located in the General Post-Office building. To this office is assigned the duty of auditing the accounts of the Post-Office Department.

V.—*CATALOGUE OF POST OFFICE DEPARTMENT SECTION, INTERNATIONAL EXHIBITION,* 1876.

CENTENNIAL BRANCH POST-OFFICE, PHILADELPHIA, PA.

A.—Staff and Finance Division.
B.—Money Order Division.
C.—Registry Division.
D.—City Delivery Division.
E.—Mailing and Distribution Division.
F.—Miscellaneous Division.

Division I.—RAILWAY MAIL SERVICE.

a. Railway post-office car, "Governor Dix," from the "fast mail line" of the New York Central, Michigan Southern and Lake Shore Railroads.

b. Railway post-office car, from the "limited mail line" of the Pennsylvania, Pittsburgh, Cincinnati and Saint Louis, Vandalia, Terre Haute and Indianapolis Railroads.

c. Model railway post-office car, on scale of one inch to the foot, upon 20 feet of track, exhibiting a working model of L. F. Ward's mail-pouch catcher,

Division II.—STAMPS, STAMPED AND OTHER ENVELOPES, AND POSTAL CARDS.

a. Postage stamps.—Framed specimens of each of the styles of postage-stamps heretofore issued by the Post-Office Department, 1847 to 1876, inclusive.

b. Stamped envelopes, first series.—Framed specimens of each of the styles of stamped envelopes of the first series issued by the Post-Office Department, 1853 to 1870. George F. Nesbitt, contractor.

c. Stamped envelopes, second series.—Framed specimens of each of the styles of stamped envelopes of the second series issued by the Post-Office Department, 1870 to 1874. George H. Reay, contractor.

d. Stamped envelopes, third series.—Framed specimens of each of the styles of stamped envelopes of the third series issued by the Post-Office Department, 1874 to 1876. Plympton Envelope Company, contractor.

e. Official envelopes.—Framed specimens of each of the styles of official envelopes in use by the Post-Office Department.

f. Postal cards, first series.—Framed specimens of the first series of postal cards, used prior to 1875.

g. Postal cards, second series—Framed specimens of the second series of postal-cards, 1875 to 1876.

h. Envelope machine for gumming, embossing, printing, and folding United States stamped envelopes. Furnished for exhibition by the Plympton Envelope Company.

i. Baxter steam engine (two horse-power), used in operating the envelope machine.

DIVISION III.—POSTAL TOPOGRAPHY.

A series of maps and atlases, illustrative of the postal service of the United States, and exhibiting the location of the 36,383 post-offices and 9,003 post-routes in operation therein, June 30, 1876, viz:

	Miles.
Railway post-routes	72,348
Domestic steamboat routes	14,883
All other steamboat routes	194,567
Total (9,003 routes)	281,798

a. Map of the United States and Territories, scale 16 miles to the inch, illustrating the 72,348 miles of railway mail service of the United States Post-Office Department.

b. Two atlases of post-route maps (in sheets).

c. Map of the post-offices and post-routes in the State of Maine, showing the location of the 877 post-offices in that State, with their routes of supply. Scale, 8½ miles to the inch.

d. Map of the post-offices and post-routes in the New England States (exclusive of Maine), showing the location of the 2,193 post-offices in those States, with their routes of supply. Scale, 6 miles to the inch.

e. Map of the post-offices and post-routes in the State of New York, showing the location of the 2,835 post-offices in that State, with their routes of supply. Scale, 6 miles to the inch.

f. Map of the post-offices and post-routes in the States of Pennsylvania, New Jersey, Delaware, and Maryland, and in the District of Columbia, showing the location of the 4,537 post-offices in those States, with their routes of supply. Scale, 6 miles to the inch.

g. Map of the post-offices and post-routes in the States of Ohio and Indiana, showing the location of the 3,712 post offices in those States, with their routes of supply. Scale, 8 miles to the inch.

h. Map of the post-offices and post-routes in the States of Michigan and Wisconsin, showing the location of the 2,469 post-offices in those States, with their routes of supply. Scale, 10 miles to the inch.

i. Map of the post-offices and post routes in the State of Minnesota, showing the location of the 832 post-offices in that State, with their routes of supply. Scale, 10 miles to the inch.

k. Map of the post offices and post-routes in the States of Illinois, Iowa, and Missouri, showing the location of the 4,767 post-offices and post routes in those States, with their routes of supply. Scale, 10 miles to the inch.

l. Map of the post-offices and post-routes in the States of Kansas and Nebraska, showing the location of the 1,688 post-offices in those States, with their routes of supply. Scale, 10 miles to the inch.

m. Map of the post-offices and post routes in the Territory of Colorado, showing the location of the 212 post-offices in that Territory, with their routes of supply. Scale, 15 miles to the inch.

n. Map of the post-offices and post-routes in the States of California and Nevada, showing the location of the 855 post-offices and post-routes in those States, with their routes of supply. Scale, 10 miles to the inch.

o. Map of the post-offices and post-routes in the States of Virginia, West Virginia, Maryland, and Delaware, showing the location of the 2,936 post-offices in those States, with their routes of supply. Scale, 8 miles to the inch.

p. Map of the post-offices and post-routes in the States of North Carolina and South Carolina, showing the location of the 1,630 post-offices in those States, with their routes of supply. Scale, 8 miles to the inch.

q. Map of the post-offices and post-routes in the State of Florida, showing the location of the 222 post-offices in that State, with their routes of supply. Scale, 16 miles to the inch.

r. Map of the post-offices and post-routes in the States of Alabama and Mississippi, showing the location of the 1,372 post offices in those States, with their routes of supply. Scale, 10 miles to the inch.

s. Map of the post-offices and post-routes in the States of Louisiana and Texas, showing the location of the 1,253 post-offices in those States, with their routes of supply. Scale, 16 miles to the inch.

NOTE.—Maps of a few of the States and Territories, which exist as yet only in a manuscript form in use for the Post-Office Department were not exhibited.

DIVISION IV.—MAIL EQUIPMENTS.

a. Mail locks.—Framed specimens of each style of mail lock in use by the Post-Office Department, from 1800 to 1876, inclusive. One frame, eighteen specimens.

b. Mail pouches and sacks.—Glass case, containing a specimen of each style of canvas mail-bag and of leather pouch in present use by the Post-Office Department; also specimens of several kinds of materials used in the manufacture of such bags and pouches. Case and specimens furnished by John Boyle, contractor, Nos. 203 and 205, Fulton street, New York, N. Y.

c. Mail pouches and bags.—Eight specimens of leather mail pouches furnished for exhibition by the contractors, Polydore S. Thompson, No. 338 Broadway, New York, N. Y., and John C. Fetterman, Albany, N. Y.

DIVISION V.—MAIL COLLECTIONS AND DELIVERY.

a. Street letter-boxes.—One specimen each, two styles street or lamp-post letter collection boxes.

b. Post-office lock-boxes.—One specimen each, two styles post-office lock-boxes for letter delivery.

c. Newspaper lock-boxes.—One specimen each, two styles post-office lock-boxes for newspaper delivery.

These boxes were furnished for exhibition by the Johnson Rotary-Lock Company of New York through their secretary and treasurer, Mr. J. L. Chambers.

d. Mail pouch for use of "letter-carriers" in the collection and delivery of mail.

e. Safety chain for use of "letter-carriers" in attaching key to belt.

DIVISION VI.—MARKING, RATING, AND CANCELING.

a. Letter and mailing scales.—One specimen each, all styles of scales used by the Post-Office Department for weighing letters, newspapers, miscellaneous mailable matter, and mails in bulk. These exhibits were furnished by the "Fairbanks Scale Company," contractor.

b. Marking, rating, and canceling stamps.—Framed specimens one each, of all styles of marking, rating, and canceling stamps used by the Post-Office Department. One frame.

DIVISION VII.—MISCELLANEOUS.

a. Postmaster-General Franklin's ledger.—Glass case containing the ledger in which Benjamin Franklin, first Postmaster-General of the United States, kept the accounts of the Post-Office Department in the year 1776. Furnished for exhibition by the Auditor of the Treasury for the Post-Office Department.

b. Glass case containing the *Diary of Hugh Finley*, surveyor (or special agent) of the Post-Office Department of the British-American Colonies, written in 1773. This diary contains a detailed account of a survey of the post-offices and post-roads between Casco Bay, Maine, and Savannah, Ga., begun September 13, 1773, and ended June 26, 1774.

c. Post-Office blanks.—Bound volume, containing one specimen each, of all the varieties of blanks and blank forms in use by the United States Post-Office Department in 1876.

d. Postal laws and regulations, postal conventions, distances, and documents of the United States Post-Office Department. One volume bound.

e. American Star Papers, relating to postal affairs from 1789 to 1832, inclusive, and a "treaty concerning a general postal union" made in 1874. One volume bound.

f. Advertisements of October, 1875, for carrying the mails of the United States from July 1, 1876, to June 30, 1877, inclusive, in the following States, viz: Pennsylvania, Maryland, Delaware, and New Jersey; and from July 1, 1876, to June 30, 1880, inclusive, in North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, and Ohio. One volume bound.

g. United States Official Post-Office Guide.—Two volumes. Vol. I, October, 1874, to July, 1875; Vol. II, October, 1875, to January, 1876.

h. *Reports of the Postmasters-General* of the United States. Five volumes. Vol. I, 1833 to 1850, inclusive; Vol. II, 1851 to 1858, inclusive; Vol. III, 1859 to 1864, inclusive; Vol. IV, 1865 to 1870, inclusive; Vol. V, 1871 to 1875, inclusive.

i. *Post days at Boston for the year* 1795.—Schedule of arrivals and departures of mails at the post-office at Boston, Mass., in the year 1795. Donated by General William L. Burt, late postmaster at Boston, Mass.

k. Engraved and photographed likenesses of the Postmasters-General of the United States. From the Post-Office Department, at Washington, D. C.

APPENDIX.

VI.—*THE CENTENNIAL BRANCH POST-OFFICE, PHILADELPHIA, PA.*

This post-office was fully opened for business March 10, 1876, by order of the Postmaster-General dated February 14, 1876, and was closed November 30 of the same year. It was established for the accommodation of the officers, attendants, and visitors at the United States International Centennial Exhibition of 1876, and was, moreover, designed as a "model post-office," complete in all its appointments, to exhibit in detail the appliances, arrangements, and methods employed for the transaction of post-office business in the United States.

In the allotment of space for this purpose about one-half of the southern transept of the United States' Government Building was used, covering about 2,100 square feet. The fittings were in walnut, richly panneled with appropriate carvings, emblematic of postal matters, and were surrounded by highly embellished moldings. Ten letter-carriers and seven clerks were employed, and five wagons, specially constructed for the purpose, with drivers in uniform, were used in making an hourly exchange of mails between this branch office and the main post-office of the city. Fifty ornamental pedestal letter-boxes were located throughout the buildings and grounds, bearing a notification in seven languages that hourly collections would be made from them by carriers.

The locks used upon these boxes were nickel-plated, of a special design and extra finish, bearing upon their face an embossed representation of the "old bell" of Independence Hall, Philadelphia, Pa., with the words and figures, "Liberty Bell—1776–1876—Centennial." They were furnished by Messrs. Smith & Egge, of Bridgeport, Conn., the contractors.

Envelopes with an embossed stamp of an entirely new design, indicating the progress made in postal facilities in this country during the last century, were manufactured and sold in the Government building. Of these stamped envelopes 689,000 were retailed at the branch office, and the total value of postage-stamps, &c., sold amounted to $49,328.60.

The following is a tabular statement of the business transacted at the Centennial branch office:

MAIL MATTER DELIVERED.

Month.	Mail letters.	Local letters.	Mail postal cards.	Local postal cards.	Newspapers.
March	1,527	669	108	144	439
April	17,075	5,660	1,150	1,368	4,834
May	47,050	5,883	6,488	5,883	35,957
June	84,033	30,795	13,146	10,039	76,186
July	86,554	27,461	14,637	11,114	80,018
August	97,472	27,586	14,885	10,913	100,150
September	107,728	26,021	19,670	12,024	104,916
October	121,976	27,671	22,928	11,295	112,681
November	70,171	19,335	10,896	7,645	61,074
Total	633,586	171,081	103,908	70,425	576,255
Grand total					1,555,255

MAIL MATTER COLLECTED.

Month.	Mail letters.	Local letters.	Mail and local postal cards.	Newspapers.
March	906	551	195	138
April	14,468	1,878	2,506	6,775
May	45,049	14,910	9,713	14,517
June	93,959	31,571	26,657	38,378
July	106,294	30,477	30,816	50,970
August	121,807	33,388	40,442	60,711
September	133,072	34,595	59,743	73,042
October	144,963	35,358	39,618	71,965
November	70,302	19,468	35,997	31,815
Total	730,820	205,199	295,687	348,911
Grand total				1,580,617

Whole number of pieces delivered and collected within the Centennial grounds	3,135,872
Registered letters mailed	2,255
Registered letters delivered	2,047

MONEY ORDERS ISSUED.

Month.	Domestic money orders.		Foreign money orders.	
	Number.	Amount.	Number.	Amount.
March, April, May	212	$4,012 08	16	$324 75
June	564	11,280 62	24	566 25
July	544	10,555 60	20	480 00
August	518	10,802 09	19	326 95
September	734	16,389 73	32	590 37
October	595	14,071 79	31	676 63
November	318	7,591 23	20	313 75
Totals	3,485	74,703 14	162	3,284 70

Total number issued	3,647
Total money received	$77,987 84

MONEY ORDERS PAID.

Month.	Domestic money orders.		Foreign money orders.	
	Number.	Amount.	Number.	Amount.
March, April, May	11	$230 92	2	$53 52
June	95	2,476 90	1	10 00
July	167	4,313 79	3	65 17
August	176	4,425 84		
September	249	6,488 29	11	276 90
October	221	5,184 46	4	103 70
November	163	3,367 77	8	167 66
Total	1,092	26,482 85	29	676 95

Total number received	1,121
Total money paid	$27,159 80

[*] In view of the comparatively slight business done in March and April, the money-order statements for these months were included in that of May.

The business of the Centennial branch post office compares very favorably with that of the postal business transacted at the Vienna Exposition in 1873. At Vienna forty-three persons, clerks, carriers, &c., were employed, and the post-office of the Exposition was kept in operation one month longer than the Centennial post-office. A summary of the business transacted is as follows:

Total number of pieces of mail matter collected and delivered	630,654
Registered letters mailed	10,671
Registered letters delivered	15,454
Money orders issued	1,820
Money orders paid	1,668

In connection with the Centennial branch office were two railway post-offices (Exhibits *a* and *b*, Division I of this catalogue), in which were made up, under the supervision of the assistant general superintendent of the railway mail service, by a competent corps of clerks detailed from the various lines of railway post-offices throughout the country, all the outgoing mails from the Exhibition grounds. The number of letters and circulars handled in these cars, during the continuance of the Exhibition, is stated at 30,000 per day during the months of August, September, and October. The total number handled is estimated at 4,000,000 pieces.

The above statement includes circulars received from the city office for mailing on the cars, and likewise letters and circulars deposited in the pedestal boxes in the branch post-offices, and in the mailing boxes of the two post-office cars.

VII.—THE RAILWAY POST-OFFICES AND RAILWAY MAIL SERVICE OF THE UNITED STATES.

As early as 1864 the revolution in the commercial methods of the country, caused by the rapid development of its railroad system, had impressed upon the attention of the Post-Office Department the necessity for some improved system of mail distribution, whereby the cumbersome and tedious delays at distributing post-offices might be avoided. Prior to this date these offices, located in a few only of the largest cities of the United States, had been confined to the exchange of mails with each other by means of "through" pouches. Letters deposited in a post-office in any section of the country were forwarded to the distributing office for that section, where a distribution, in accordance with their direction, was made, and they were then forwarded to another distributing office for final dispatch to destination. Serious delays were caused by this method. Mails arriving on trains could not, in most cases, be distributed in time to depart with the next outgoing trains, and hence frequently met with a delay of twenty-four hours, so that it was no uncommon occurrence for travelers over long distances to arrive at destination in advance of letters leaving with or before them. It is true that, for some time previous to this date, agents of the Department had been employed upon the mail cars of the various lines of railroad in the United States, but they acted, for the most part, solely as custodians and supervisors of the mails in their charge, their sphere of duty being limited to the delivery of pouches made up at the several distributing offices for the local post-offices along their respective routes; to the pouching and delivery of mail matter received by them from such local offices; and to the forwarding to terminal distributing offices of mails destined for more distant points.

During the fiscal year ended June 30, 1864, the Department inaugurated the experiment of placing upon several of the great railroad lines, terminating at important distributing centers, skilled clerks, detailed from distributing post-offices. These clerks were required to make, as far as practicable, upon the mail car, before reaching destination, the same distribution that had been made previously in distributing offices. By this means each through mail, hitherto detained for distribution at some distributing office, was pouched while in transit, and was ready, on the arrival at the railroad terminus, to be forwarded towards its destination by the first connecting train.

The first official notice of this experiment was made by the Postmaster-General in his annual report for that year (1864), in which he says:

> The mailing of all letters direct from one office to another in so vast a territory as that embraced within the United States is objectionable. The ordinary distributing post-office not meeting the necessities of the service, experiments have been commenced with railway and traveling post-offices. The requisite cars for the purpose are prepared for one daily line between Washington and New York, and, by means of clerks, taken temporarily from post-offices at Washington, Baltimore, Philadelphia,

and New York, letters intended for distribution at either of those points are distributed in the cars, and so arranged that they can be dispatched without delay on connecting routes. Thus it is found that the transmission of letters is expedited from twelve to twenty-four hours, being the time usually lost in distributing post-offices. Similar experiments have been made on the route from Chicago, Ill., to Clinton, Davenport, and Dubuque, Iowa, with equally satisfactory results.

* * * * * * *

In order to make the work of railway post-offices effectual, a change in the mode of mailing letters is necessary. All offices cannot mail direct, neither can all mail to a railway post-office. The work will therefore be divided between head offices and route offices, the former being those that are the initial or terminal points of routes, and the latter those offices or stations on the direct line of a road from which there are no post-roads diverging.

The introduction of the proposed scheme will necessarily be attended with difficulties, and must be accomplished gradually. The classification of offices alone requires time and labor, and, for the present, operations will be limited to a few principal railroad lines. Until the necessary classification is completed, and the railway distribution organized, it is anticipated that additional expense will be involved, but it is hoped that the final effect will be to reduce the expenses connected with the present plan of distribution.

These experiments proved successful, and the service was gradually extended, until, in 1865, 1,041 miles of railway post-office service were in operation, employing 64 clerks, while the aggregate railroad service not thus operated was 22,000 miles.

In 1867 the number of railway post-office routes had increased to 18, the length of their lines to 4,435 miles, and the number of clerks to 160. In the report of the Postmaster-General for that year it is estimated that the reduction of labor in the distributing post-offices of the country, resulting from the introduction of railway distribution, when taken in connection with the saving of time in the transmission of the mails over railway post office routes, "would seem sufficient to justify the increased expenditure." In the report for 1868 it is estimated that, in addition to the great saving of time in the transmission of mails, above mentioned, there was a saving of postmasters' commissions upon sales of stamps, caused by the mailing of large numbers of letters upon the cars, which, added to the amount saved by the reduction in the force of route agents and clerks in local post-offices, more than covered the entire cost of the railway post-office service.

In his report for 1869 the Postmaster-General, speaking of this system of distribution, says:

> It has become an essential part of the service. It is, in fact, indispensable, and, as the population and wealth of the country shall increase, it will be necessary to extend it to keep pace with the wants and demands of the people.

So, in 1870, the report says:

> The system has been found in practice to accomplish all that has been claimed for it, and its usefulness has been clearly demonstrated.

During the year ended June 30, 1871, a continuous railway post-office service was established from Vanceborough, on the eastern boundary of Maine, to San Francisco, Cal., on the Pacific coast.

Prior to 1874 the country, for the convenience of the service, was divided into five districts or "divisions." To each of these was assigned an "assistant superintendent of railway-mail service," with supervisory jurisdiction over the dispatch, forwarding, and distribution of mails in the post-offices and over the lines of mail service included within the territorial limits of his division.

In 1874 a reorganization of the service was made, by which the territory of the United States was redivided into eight divisions, with a superintendent in charge of each, and over the whole service was appointed a "general superintendent," with headquarters at the seat of the Government.

From time to time disagreements have arisen between the Department and several of the railroad companies relative to the amount of compensation to which the latter are entitled for the carrying of the mails over railway post-office routes. The failure thus far to adjust the compensation of these companies, upon a basis at once satisfactory to them and equitable to the public service, has, in a measure, prevented the railway-mail system from assuming that just relation to the other divisions of the postal service which its importance seems to demand; but negotiations are now pending which, it is believed, will remove this want of harmony, thereby assuring the extension and perfecting of this system in a manner and to an extent commensurate with the wishes of the people and the business requirements of the country.

During the year 1875 the vast increase in the bulk of mail matter transmitted between the different sections of the country seemed to indicate a necessity for especial facilities for rapid transit and quick distribution. With this end in view, arrangements were entered into between the Post-Office Department and several of the great trunk lines which connect the Atlantic seaboard with the Valley of the Mississippi, for the establishment of special and fast service; and on the 16th day of September, 1875, in pursuance of these arrangements, two lines of railway post-offices went into operation, connecting Saint Louis, Cincinnati, and Chicago with Philadelphia, New York, and Boston, accomplishing the distance of 1,064 miles between New York and Saint Louis, via Philadelphia, Harrisburg, Pittsburgh, Columbus, and Indianapolis, in thirty-three hours, and the distance of 979 miles between New York and Chicago, via Albany, Buffalo, and Cleveland, in twenty-four hours, giving to the territory embraced within the scope of their distribution mail facilities unequaled in any other country.

The Saint Louis and New York line was represented at the Centennial Exhibition by one of its "limited mail" working cars, and the Chicago and New York line by the working car "Governor Dix." These cars were furnished by the companies to which they respectively belong, as a part of the exhibit of the Post-Office Department, and were placed on a model track, built by the Pennsylvania Railroad Company, adjoining the Government building. One of them was marked *a* and the other *b* in Division I of the exhibit of the Post-Office Department, and they are so inscribed in this catalogue.

At the close of the last fiscal year this fast-mail service was withdrawn by the railroad companies operating the lines upon which it had been established. The reason assigned for this action was that they were not receiving, under the laws regulating their compensation, an equivalent for the service performed.

NOTE.—December 18, 1876. Since the preparation of the above article, this "service" has been resumed upon the lines of the Pennsylvania Railroad Company, connecting New York with Chicago, Saint Louis, and Cincinnati by way of Philadelphia, Harrisburg, and Pittsburgh, the company, by special arrangement with the Post-Office Department, having agreed to continue the service at the former rate of compensation, pending the action of Congress thereon.

VIII.—*THE RAILWAY MAIL BAG CATCHER.*

This desideratum in the railway mail service of the United States was invented, in the year 1865, by Mr. L. F. Ward, of Elyria, Ohio, was adopted by the Post-Office Department in 1866, and was patented by the inventor in 1867. Previous to the introduction of the "catcher" there had been no contrivance in use in this country by which mails could safely and certainly be received upon railway trains passing flag stations at ordinary rates of speed, and the frequent failure of express trains to stop at these stations was, in nearly all cases, the cause of the failure of mails to leave their point of departure on time, except in occasional instances where they could be thrown into the doors of passing cars, or caught in the unprotected arms of route agents.

In the autumn of 1865 Mr. Ward accompanied Mr. G. B. Hamilton, a route agent upon the Cleveland, Columbus and Cincinnati Railroad, upon a trip for the purpose of devising, if possible, some mechanical method by which mail bags could be taken up, with safety and certainty, by trains in motion. The requisite qualities that such a contrivance should possess were these: It must be simple, strong, durable, and compact; it must not be liable to get out of order, must not interfere with the opening or closing of car doors, nor with the egress or ingress; must thereat not occupy space needed for other purposes; must not be in danger of collision with objects outside the car; must be light and easily operated, and must take up mails of any required weight at any rate of speed. A fork, between the arms or prongs of which a mail bag could be firmly driven by the momentum of the train, one prong to lie parallel with the side of the car and the other to form an inclined plane at an acute angle therewith, suggested itself as a solution of the problem. All subsequent experiments have tended to confirm this solution. Mr. Ward returned home and at once caused a catcher to be constructed upon this principle, and to be placed upon one of the cars of the above-named railroad. From the beginning it was a complete success, and, although subsequently improved in some of its minor details, there has been no material deviation, up to the present time, from the primitive model.

During the first year after its invention it was only used upon the cars of the Cleveland, Columbus and Cincinnati Railroad, and was there inspected by expert agents, sent from the Post-Office Department for the purpose, among whom was Mr. George B. Armstrong, the first Superintendent of Railway Mail Service. These agents reported favorably, and, on the 8th of December, 1866, by an order of the Postmaster-General, it was officially adopted by the Post-Office Department.

The Baltimore and Ohio Railroad Company was the first to build cranes for holding mail bags in a position for catching, and by that company the catcher service was practically inaugurated. The New York and Erie Railroad Company, upon whose road railway post-offices had been built, but had not commenced running for want of some means of picking up mail bags by moving trains, was the next to bring this invention into use. From this time forward the putting up of cranes and catchers progressed rapidly, and, at the present date, nearly every important line of railway in the United States and Canada is supplied with them. By means of their use the mail service is thoroughly performed upon the fastest trains, mail bags being taken up by them, while passing flag stations, at the highest rates of speed, with as much certainty as at cities where full stops are made.

To meet the requirements of the service upon the "fast mail" of the New York Central and Michigan Southern, and upon the "limited mail" of the Pennsylvania roads, Mr. Ward devised an improved and stronger catcher, but in it there has been no deviation from the principle and very little from the form first adopted.

Catchers, with the necessary attachments, are, at the present time, manufactured by contract, and are supplied by the Post-Office Department. Cranes, upon which to suspend mail pouches in a position to be taken up by the catcher, are built and kept in repairs by the railroad companies using them, in conformity with plans and specifications furnished by the Department.

The figures here given in Plates A and B illustrate fully the method of constructing and operating the catcher.

PLATE A.—*The mail catcher.*

FIG. 1 represents the first form of the catcher. This is now in use upon railroads where the mails to be taken up are light and the rate of speed of trains low.

FIG. 2 represents the improved catcher used on roads where the mails are heavy and the rate of speed high.

A A iron socket or stem by which the prongs or arms B B and C C are held firmly in place.

PLATE A.

Fig. 1.

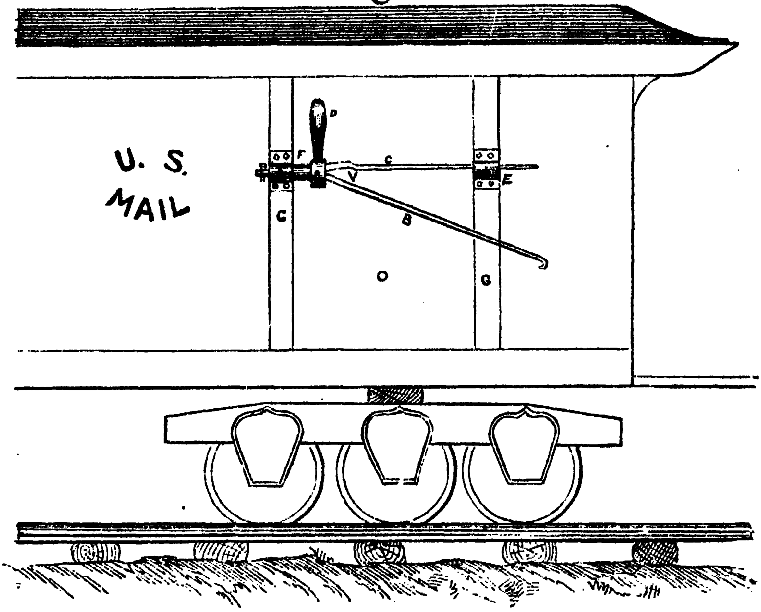
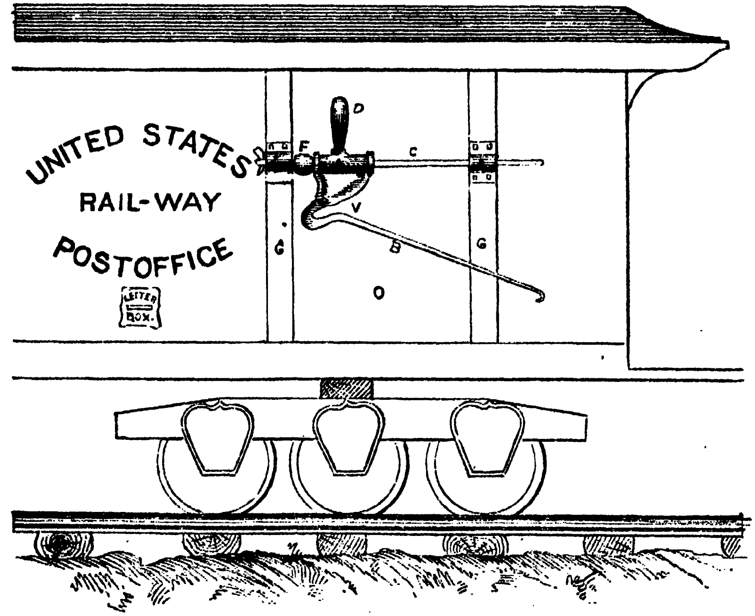


Fig. 2.



B B exterior arm, fixed in the socket at an angle, V, of 22° with the interior arm C C. This arm is shown at rest, dropped against the side of the car. When in use it is raised to a horizontal position on the same plane with C C, the angle V operating forward at 22° off the line of motion.

C C, interior arm, a shaft turning freely in the boxes E E E E.

D D, wooden handle, by means of which the interior arm C C is turned in the journal boxes, and the exterior arm B B is raised to a horizontal plane with C C.

E E E E, journal boxes, in which turn the shaft or interior arm C C.

F F, rubber ring on arm C C, against which slides the socket A A, so fixed to counteract the shock of receiving the pouch in the angle V V.

G G G G, door posts of mail car.

O O, doorway.

PLATE B.—*The mail crane.*

FIG. 1 represents the crane complete and in position for use.

FIG. 2 represents the details of different portions of the crane.

A, the base, a raised platform surmounted by steps upon which the operator stands while fixing the mail pouch in place. The base is usually a cubical box, of about 2½ feet dimensions, filled with broken stone for holding it in position.

B, the stem, a perpendicular post which supports the arms of the crane. It is firmly bolted to the platform A.

C, the superior arm. At the extremity of this arm, upon the end of the spring K, the mail pouch is suspended. The arm is supported near its center by, and partially revolves upon, a pin passed through the lug H. The free end of this arm is heavier than that upon which the mail pouch is suspended, so as to insure its dropping readily to a perpendicular position when relieved of the weight of the pouch, as shown by the dotted outline.

D, the inferior arm. At the outer extremity of this arm, by the spring K, the lower end of the mail pouch is held firmly in place. When released from the pouch this arm drops to a perpendicular position, as shown by the dotted outline. The details of this arm is shown in Fig. 2.

E, the *check block*, bolted to the top of the inferior arm to prevent the latter from being lifted above a horizontal position.

F, the *loop*, a band of strap iron sliding freely on the stem B, and forming the lugs and hinge to which the arm D is attached. By means of this loop the elevation of the inferior arm is regulated. (Also see Fig. 2.)

G, the *stop* fastened to the side of the stem to prevent the inferior arm, when not in use, from falling to the platform.

H, *lugs* of cast iron, bolted to the top of the stem B, for holding the superior arm in place.

PLATE B.

Fig. 1.

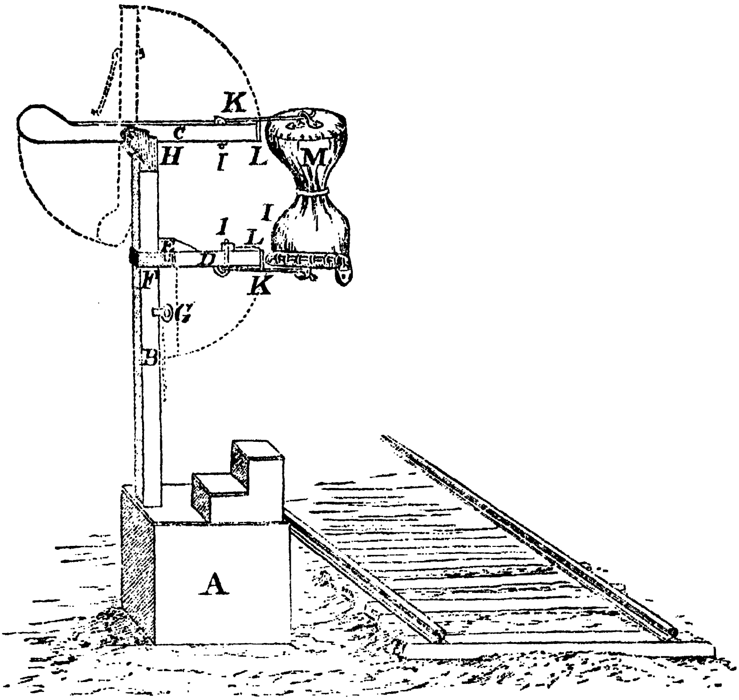
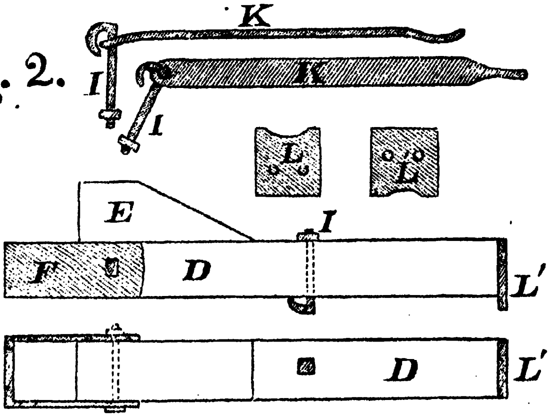


Fig. 2.



I I, *eye bolts*, for holding the inner ends of the springs K and K. (Also see Fig. 2.)

K K, *tension springs*, 21 inches long, upon which the mail pouch is stretched. K is made of 1¾ by ¼ and of 1¼ by ¼ spring steel. The inner end of each spring is perforated with a hole, through which passes the hook of the eye bolts, and by means of which the springs are permitted to swing freely when not in use. The outer ends of the springs are slightly narrowed and curved, one upward and the other downward, so as to prevent the handles of the pouch from slipping too easily from the springs. (Also see Fig. 2.)

L L′, *tension plates*, screwed upon the ends of the arms. L is concave upon its upper edge, and is fastened to the superior arm in such a manner as to hold the spring about three-eighths of an inch away from the surface of the arm. L′ is the reverse of L, holding its spring away from the under surface of the inferior arm. (Also see Fig. 2.)

M, *mail pouch*, in position for being taken up by the catcher. The pouch should be belted or tied around the middle by a strap or string, so as to give it the proper diameter for passing easily between the prongs of the catcher, and should be hung in an inverted position, as shown in the diagram.

HOW TO OPERATE THE CATCHER.

The pouch being already placed in position, as shown in Plate B, one of the employés from within the approaching mail car seizes the handle D (Plate A), and brings the prong B to a rest in a horizontal position. On passing the crane the middle of the pouch strikes the inside of the prong B about half way out from the socket A, slides with force into the angle V, which strips it from its fastenings upon the crane and carries it forward with the car, into which it is taken by the employé inside. The arms of the crane, being thus set free at once drop to the perpendicular position of rest.

IX.—*POSTAGE-STAMPS; STAMPED ENVELOPES; POSTAL CARDS, ETC.*

The use of postage-stamps in the United States was first authorized by act of Congress approved March 3, 1847, and their issue, in denominations of 5 and 10 cents only, to meet the then existing rates of postage, was begun by the Post-Office Department on the 1st of July following. Previous to this date postage was collected entirely in money, its prepayment being in all cases optional.

On the 1st of July, 1851, under the operation of the act of Congress of March 3 of that year, reducing the rates of postage, a new series of postage-stamps was adopted, consisting at first of denominations of 1 and 3 cents only, but subsequently of the additional denominations of 5, 10, 12, 24, 30, and 90 cents. The issue of these stamps continued until 1861, when, soon after the commencement of the late rebellion, to prevent the use of such of them as were outstanding in the hands of postmasters in the insurrectionary States, the series was superseded by a new one of the same denominations, but of different designs and colors. Another denomination—2 cents—was, however, added on the 1st of July, 1863, to accommodate the local rate of postage. Moreover, in consequence of a change in the rates of newspaper postage, special stamps of large size, in denominations of 5, 10, and 25 cents, were issued on the 1st of April, 1865, but soon fell into disuse on account of unpopularity.

In March, 1869, a new series of stamps replaced those then in use, of the same denominations, except that a 6-cent was substituted for the 5-cent stamp, but the series not meeting with favor, it was, in its turn, superseded in May, 1869, by the stamps now in use. The same denominations continued to be employed, with the subsequent addition of a 7-cent stamp, until July 1, 1875, when a 5-cent stamp was added, and the 7, 12, and 24 cent stamps were discontinued. The series, therefore, at present consists of the following denominations: 1, 2, 3, 5, 6, 10, 15, 30, and 90 cents.

By act of Congress of March 3, 1873, in consequence of the repeal of the franking privilege, the Postmaster-General was required to provide stamps or stamped envelopes, of special design, for each of the several Executive Departments, to prepay postage on official matter passing through the mails. The issue of these stamps was commenced on the 24th of May, 1872, for use on the 1st of July following, and still continues. Their denominations are as follows: Executive, 1, 2, 3, 6, and 10 cents; Department of State, 1, 2, 3, 6, 7, 10, 12, 15, 24, 30, and 90 cents, and 2, 5, 10, and 20 dollars; Treasury, War, and Navy Departments, each, 1, 2, 3, 6, 9, 10, 12, 15, 24, 30, and 90 cents; Departments of Interior, Justice, and Post-Office, each, 1, 2, 3, 6, 10, 12, 15, 24, 30, and 90 cents; Department of Agriculture, 1, 2, 3, 6, 10, 12, 15, 24, and 30 cents.

Under the act of Congress approved June 23, 1874, stamps of special designs were provided for the prepayment of postage on newspapers and periodicals mailed from known offices of publication or news agencies. The act took effect on the 1st of January, 1875, but the issue was begun on the 11th of December previous, and still continues. The following are the denominations: 2, 3, 4, 6, 8, 9, 10, 12, 24, 36, 48, 60, 72, 84, and 96 cents, and 1.92, 3, 6, 9, 12, 24, 36, 48, and 60 dollars.

The following tables give the issues of postage-stamps from the date of their adoption to the present time:

Stamps issued for sale to the public.

Year ended—	Number of stamps.	Value.
June 30, 1847, to 1851	4, 603, 200	$274, 710 00
June 30, 1852	54, 136, 319	1, 535, 638 51
June 30, 1853	56, 344, 000	1, 608, 792 91
June 30, 1854	56, 330, 000	1, 526, 300 00
June 30, 1855	72, 977, 300	2, 056, 127 00
June 30, 1856	126, 045, 210	3, 611, 274 40
June 30, 1857	154, 729, 465	4, 337, 135 20
June 30, 1858	176, 761, 835	4, 945, 374 35
June 30, 1859	192, 201, 920	5, 279, 405 00
June 30, 1860	216, 370, 660	5, 920, 939 00
June 30, 1861	211, 788, 518	5, 908, 522 60
June 30, 1862	251, 307, 105	7, 078, 188 00
June 30, 1863	338, 310, 385	9, 683, 394 00
June 30, 1864	334, 054, 610	10, 177, 327 00
June 30, 1865	387, 419, 455	12, 099, 987 50
June 30, 1866	347, 734, 325	10, 816, 661 00
June 30, 1867	371, 599, 605	11, 578, 607 00
June 30, 1868	383, 470, 500	11, 751, 014 00
June 30, 1869	421, 047, 460	12, 722, 568 00
June 30, 1870	468, 118, 445	13, 976, 768 00
June 30, 1871	498, 126, 175	14, 630, 715 00
June 30, 1872	541, 455, 070	15, 840, 649 00
June 30, 1873	601, 931, 520	16, 681, 189 00
June 30, 1874	632, 733, 420	17, 725, 242 00
June 30, 1875	684, 551, 685	19, 087, 381 47
June 30, 1876	700, 089, 437	19, 718, 708 75
Aggregate	8, 284, 267, 630	240, 572, 618 69

Official postage-stamps.

	June 30, 1873.*	June 30, 1874.	June 30, 1875.	June 30, 1876.	Aggregate.
Executive	$1, 650	$16, 250	....	$15, 000	$35, 900
State	60, 495	101, 595	$100, 500	34, 500	297, 090
Treasury	6, 317, 500	9, 442, 500	2, 400, 000	3, 190, 000	21, 350, 000
War	440, 500	703, 050	659, 000	646, 860	2, 149, 410
Navy	160, 830	315, 330	213, 700	217, 000	936, 860
Post-Office	5, 510, 610	19, 207, 110	13, 260, 270	11, 860, 005	49, 837, 995
Interior	970, 475	1, 994, 250	1, 419, 370	1, 604, 700	5, 988, 795
Justice	55, 400	100, 000	66, 100	59, 600	281, 100
Agriculture	135, 000	440, 000	347, 000	55, 000	977, 000
Total stamps	13, 655, 460	32, 320, 085	18, 495, 940	17, 682, 665	82, 154, 150
Total value	$494, 974 70	1, 415, 845 20	834, 970 25	663, 831 58	3, 409, 621 65

* Two months only.

The first issue of stamped envelopes was begun in June, 1853, the denominations being 3 and 6 cents; but during the following year the design of the 3-cent envelope was altered, and on the 25th of April, 1855, a 10-cent envelope was added. This series remained uninterruptedly in use until October, 1860, when it was succeeded by new designs of all three denominations, with additions of a 1 and a 4 cent denomination (the latter being a combination of the 1 and 3 cent stamps) in December, 1860, and of 12, 20, 24, and 40 cent denominations in January, 1861. In July of the same year (owing to the rebellion in the Southern States), the designs of the three principal denominations—3, 6, and 10 cents—were again changed, remaining in use until September, 1864, when the 3 and 6-cent designs were further altered. In June, 1863, however, a 2-cent denomination was adopted, and in December, 1865, four others—9, 12, 18, and 30 cents—the 24 and 40 cent denominations being likewise changed in design. This series, consisting of denominations of 1, 2, 3, 6, 9, 10, 12, 18, 20, 24, 30, and 40 cents, continued in use until 1870.

Up to October, 1859, the stamped envelopes issued had all been plain, but at that time a self-ruling envelope was added to the series, meeting, however, with only a moderate demand. In May, 1865, envelopes containing a printed request for the return of the letter to the writer, in case of non-delivery, began to be issued, becoming popular at once. There were also issued, in August, 1861, for the first time, stamped note and letter sheets of the denomination of 3 cents, which, though only partially successful, remained in use until April, 1864.

On the 1st of October, 1870, the entire series of stamped envelopes was changed in design, and in some of its denominations, the latter consisting of 1, 2, 3, 6, 10, 12, 15, 24, 30, and 90 cents. These designs and denominations have remained unchanged up to the present time, with the exception of the 12 and 24 cents, which have been recently discontinued. A 5 and a 7 cent denomination were also added, but the 7 cent has also lately gone out of use. For some time after the adoption of this series, envelopes were furnished, when desired, with black or faint blue lines on their face, to indicate the place for the superscription, but they continued in demand for a comparatively short period. The envelopes now being issued are of seven different sizes, of three qualities of paper, of four colors, and are furnished either plain or with "printed request," according to the desire of purchasers.

In May of the present year an entirely new and distinctive design of stamped envelope was adopted for issue during the continuance of the Centennial Exhibition at Philadelphia. Their manufacture began on the 10th of May and ended on the 10th of November. Only two sizes were made, both of first quality white paper, and of the same denomination (3 cents), the stamp on the larger size, however, being printed in red, and that on the smaller in green. The design was a shield, bearing in the upper half the device of a mounted post-boy and the date 1776, and in the lower half a representation of a "fast-mail train" and a telegraph line with the date 1876, as the principal figures.

In addition to the several kinds of stamped envelopes, described in the foregoing sketch, there was adopted, in October, 1861, a new article of postal manufacture, known as the newspaper wrapper, the convenience of which was at once recognized. So great, indeed, was the popular sense of their utility, that the issue during the first three months succeeding their introduction amounted to nearly 1,000,000. Since then they have continued to form a part of the series of stamped envelopes, and the demand for them annually increases. They are made of inexpensive manila paper, are of oblong shape, and of such size as to allow of two folds over an ordinary-sized newspaper. At first the denomination was 2 cents; in October, 1870, it was changed to 1 cent; at present they are issued of both denominations.

Soon after the repeal of the franking privilege and the consequent adoption of official stamps, two of the Executive Departments—the War and Post-Office—began the use, also, of official stamped envelopes to cover official matter passing through the mails. Such envelopes are still being used, of denominations as follows: War Department, 1, 2, 3, 6, 10, 12, 15, 24, and 30 cents; Post-Office, 2, 3, and 6 cents. The War Department envelopes are of colors and qualities such as are sold to the public; the Post-Office envelopes are of four sizes only, and all are of the same color and quality. None of the other Executive Departments have ever used official stamped envelopes.

The following tables show the number of stamped envelopes issued to postmasters for sale to the public, and of official stamped envelopes issued to the War and Post-Office Departments for official use, from the first issue to the close of the fiscal year ending June 30, 1876. In the first of these tables newspaper wrappers are included under the head of plain envelopes.

Statement of stamped envelopes issued to postmasters for sale to the public from 1853 to 1876, inclusive.

Year ended—	Plain envelopes.	Special request envelopes.	Total.
June 30, 1853	5, 000, 000		5, 000, 000
June 30, 1854	21, 384, 100		21, 384, 100
June 30, 1855	23, 451, 725		24, 451, 725
June 30, 1856	33, 764, 050		33, 764, 050
June 30, 1857	33, 033, 400		33, 033, 400
June 30, 1858	30, 971, 375		30, 971, 375
June 30, 1859	30, 280, 300		30, 280, 300
June 30, 1860	29, 280, 025		29, 280, 025
June 30, 1861	26, 027, 300		26, 027, 300
June 30, 1862	*27, 234, 150		27, 234, 150
June 30, 1863	*25, 548, 750		25, 548, 750
June 30, 1864	*28, 218, 800		28, 218, 800
June 30, 1865	25, 456, 175	750, 000	26, 206, 175
June 30, 1866	30, 386, 200	8, 708, 525	39, 094, 725
June 30, 1867	46, 421, 400	16, 665, 250	63, 086, 650
June 30, 1868	47, 894, 900	25, 469, 750	73, 364, 650
June 30, 1869	49, 851, 000	31, 824, 100	81, 675, 100
June 30, 1870	49, 951, 500	36, 338, 000	86, 289, 500
June 30, 1871	56, 563, 625	48, 111, 650	104, 675, 275
June 30, 1872	67, 100, 750	46, 825, 000	113, 925, 750
June 30, 1873	78, 971, 350	52, 201, 250	131, 172, 600
June 30, 1874	84, 478, 250	51, 940, 250	136, 418, 500
June 30, 1875	95, 135, 400	54, 631, 000	149, 766, 400
June 30, 1876	100, 965, 750	64, 554, 500	165, 520, 250
Aggregate	1, 047, 370, 275	438, 019, 275	1, 485, 389, 550

* These amounts include 212,300 stamped note and letter sheets (106,100 letter and 46,200 note).

Statement of official stamped envelopes issued to the War and Post-Office Departments from 1872 to 1876, inclusive.

Year ended—	To War Department.	To Post-Office Department.	Total.
June 30, 1873*	587, 100	4, 354, 750	4, 941, 850
June 30, 1874	2, 397, 000	10, 503, 300	12, 900, 300
June 30, 1875	2, 126, 700	10, 718, 300	12, 845, 000
June 30, 1876	2, 914, 905	12, 775, 250	15, 690, 155
Aggregate	8, 025, 705	38, 351, 600	46, 377, 305

* Two months only.

Postal cards were first employed and issued in May, 1873—the denomination being one cent—and gained immediate popularity. A new design of card was adopted in August, 1875, being the one now in use.

The number of cards issued during each year, since their adoption, is as follows:

Year ending June 30 1873 (two months only)	31,094,000
Year ending June 30, 1874	91,079,000
Year ending June 30, 1875	107,616,000
Year ending June 30, 1876	150,815,000
Total	380,604,000

MODE OF ISSUING STAMPS, ETC.

Postage-stamps, stamped envelopes, and postal cards are manufactured for the Government by contract, and are issued under the supervision of an agent stationed at the place of manufacture, upon the daily orders of the Post-Office Department. These orders are made up of items covering the wants of different postmasters, as partially made known by their requisitions from time to time received, and the stamps, envelopes, or cards called for are sent directly from the agency to the offices named in the order. As the issue of these articles is at the foundation of nearly all the revenues of the Post-Office Department, great vigilance is exercised to prevent any postmaster from being supplied therewith to an extent greater than the actual needs of his office, or to an amount exceeding his bonded liability.

For the year 1852—the year immediately preceding the introduction of stamped envelopes—the number of postmasters' requisitions for stamps was 9,200. During the year ending June 30, 1876, the number of requisitions for stamps, stamped envelopes, and postal cards amounted, in round numbers, to 312,000.

X.—*THE CENTENNIAL ENVELOPE MACHINE.*

The embossing of postage-stamps, upon envelopes, was at first executed by means of ordinary printing presses of small size, fed by hand. Later, a self-feeding machine for embossing and printing the stamp, capable of making about 24,000 envelopes per day, was invented by Edward Allen, of Norwich, Conn. During the term of the contract with George H. Reay, of the city of New York, for furnishing the Post-Office Department with stamped envelopes, that contractor built and operated a number of folding and stamping machines with various novel devices. These machines were of two kinds. One, a single machine, was capable of manufacturing 20,000 envelopes per day; the other, a double machine, making two envelopes at a time, had a capacity of 30,000 per day.

These machines are now the property of the Plimpton Manufacturing Company, the present contractors, who have, however, never made use of them in the manufacture of Government stamped envelopes.

The Plimpton Company commenced the manufacture of stamped envelopes with the Allen machine, above mentioned, but the defectiveness of its operation soon attracted the attention of their foreman, Mr. Horace J. Wickham, and induced him to make a series of experiments, the result of which has been an ingenious and successful combination of all the processes hitherto in use into a single piece of mechanism, the "Centennial Envelope Machine." A machine of this kind was placed on exhibition in the United States Government building, by the Post-Office Department, from May 10 to November 10, 1876, upon which were printed, during that period, the Centennial stamped envelopes, sold at the Centennial branch post-office at Philadelphia, Pa.

The blank envelope-paper, first having been cut into the required form by a cutting-machine, and placed in proper position in a rack, exactly fitted to its shape, is taken up, piece by piece, by the picking-up mechanism at one end of the envelope-machine, gummed, embossed, printed, folded, dried, and turned out, at the opposite end, complete in packages of 25 envelopes each, ready for banding, at the rate of about 900 packages, or over 22,000 envelopes in ten hours.

The ends of the pickers, before descending to the pile of blank envelope forms, are, by two rollers previously supplied with mucilage and moving in opposite directions, coated with sufficient gum to enable them to raise the uppermost blank from the pile, as well as to gum the top flap and hold the envelope together; at the same time a valve gum-tube, descending with the pickers to the end flap of the envelope, deposits thereon just the amount of gum required to hold that point. The blank is now quickly raised from the pile, and a pair of conveyors, gliding beneath, receive and bear it forward under the cross-bar which holds the male embossing die and the blanket for receiving the impression of the type. Here the blank remains long enough to receive the impression from the die and type, when it is passed to the folding box, folded, and dropped into the endless chain, finished.

The chain, filled with envelopes, passing over and around a fan which dries their gum, returns to the machine where each, as it arrives, is seized by a pair of steel fingers which draw it quickly aside and deposit in a box; each twenty-fifth envelope, being drawn half an inch beyond the line of its fellows, marks the completion of the package.

The envelopes, thus finished, dried, and counted into packages, are at once banded and boxed by an attendant, when they are ready for distribution.

XI.—*POSTAL TOPOGRAPHY.*

(See List of Exhibits, Division III.)

The first attempt, of which any record has been preserved, at delineating upon maps the post-routes of the territory now comprised within the limits of the United States was made by Hugh Finley, a post-office surveyor or special agent, who makes the following statement in his diary:

> In December, 1772, the Right Honorable Francis Baron Despencer, and the right Honorable Frederic Thynne, His Majesty's Postmaster-General, appointed me to be surveyor of post-roads on the continent of North America. In the month of March following I was commanded to embark for New York, to be instructed in my duty as surveyor by the resident deputy general there.
>
> I arrived at New York in April; Mr. Foxcraft was then in Virginia; without waiting his return I proceeded to Canada, in consequence of leave obtained in England, and arrived at Quebec on the last of the month.
>
> During my stay there I received orders from Mr. Foxcraft to hold myself in readiness to enter on service in September by beginning the survey in exploring the uninhabited country between the most southerly settlements on the river Chaudière, in Canada, and the most northerly habitations on the river Kennebec, in the government of Massachusetts Bay.

After detailing the difficulties encountered in obtaining the funds necessary for defraying the expenses of the expedition, Mr. Finley continues:

> Four Indians, perfectly well acquainted with all the different passes, were deemed a number sufficient to conduct me and carry the necessary provisions. Four of the most expert were accordingly engaged, with an interpreter of the Abenaqui language, to meet me on the 15th of September, at the last settlement on the banks of the Chaudière, and from thence to conduct me by the shortest way to the nearest settlements on the river Kennebec, in New England.

Finley crossed the Saint Lawrence on the 13th of September, 1773, and met his guides at the last farm on the Chaudière, 52 miles south of Quebec, on the 15th, according to appointment. By canoe and land carriage they reached Falmouth, on Casco Bay, on the 30th. On the 2d of October he left Falmouth and surveyed the post-route by way of Portsmouth, Boston, Providence, New London, New Haven, to New York, thence to Norfolk, Wilmington, Charleston, and Savannah, Ga., closing the survey on the 26th of June, 1774. Mr. Finley's notes and sketches of the route surveyed by him are very minute in detail and furnished valuable information to the postal authorities of his time. His manuscript diary was on exhibition by the Post-Office Department, marked *b*, Division VII.

From such small beginnings, made more than a century ago, over comparatively restricted areas, the United States system of post-routes has expanded, until it now embraces the supply of the mails to 36,383 post-offices upon 9,003 routes, whose aggregate length is 281,798 miles, extending into every inhabited portion of forty-eight States and Territories, comprising within their limits an area of a little less than 4,000,000 square miles.

No correct knowledge of the location of a great number of post-offices scattered over a territory so vast could be attained except through the medium of a thorough system of maps, nor could any well-organized and economically-conducted scheme of mail supply be established and continuously operated, except through a knowledge attained from such maps, supplying, from their frequently-published editions, the ever-changing topographic data of a rapidly-developing territory.

In the earlier days of the Republic, when the number of post-offices were few and confined mainly to the States bordering on the Atlantic coast, the knowledge of the topography of the country was necessarily very limited, for the surveys at that period had been few and imperfect. As settlements increased in number, and colonies of emigrants moved westward, the attention of the Department was directed to the necessity for more clearly-defined information relative to the location of distant communities, to the shortest, or most easily and rapidly traversed routes by which to reach them, and to the intervening obstacles to be overcome.

In 1839 a set of maps, elaborately engraved, were published under the auspices of the Department, and, for a short time, used with advantage in its offices; but no provision having been made to meet the constant alterations and additions necessary to make them keep pace with the frequent changes and rapid extensions of the service, they soon became obsolete, and were finally discarded. For many years thereafter the changes and extensions in the location of post-offices and post routes were based, for the most part, upon unofficial representations made to the Department, or upon references to a solitary copy, in manuscript, of each of such diagrams and maps as could then be produced by a single individual employed thereon, until the deficiencies in topographical information became so apparent, that the adoption of some system, thorough and correct in all its details, became a public necessity.

In 1866 was commenced the publication of a series of post-route maps, which, having been gradually extended, now embrace all the Northern and the greater part of the Middle and Southern States. These maps are at the present time eighteen in number, issued in forty-seven sheets. Several others as yet exist only in manuscript for want of the necessary appropriations to meet the expense of their speedy completion. They are produced partly by impressions from engraved copper plates, and partly from lithographic and photolithographic transfers. They embrace one or more States each, as their relative extent may allow, and vary in scale from a *maximum* of 6 miles to the *inch* ($\frac{1}{380160}$), for the older and more densely populated States, to 10, 16, and the minimum of 20 miles ($\frac{1}{1267200}$) for those more sparsely settled. The lines for their construction are laid down on what is called "the polyconic projection," as introduced for this continent, and systematically carried out by the United States Coast Survey. The primary geographical data have been obtained from the rigorously exact Government surveys of the coast and the great northern lakes, filled in from the township surveys of the United States General Land Office, wherever these surveys have been made. For the older States, not covered by such surveys, the best local surveys, published or in manuscript, have been used. Only one State, Massachusetts, has yet executed its own survey. For the vast and imperfectly known Territories of the western interior, advantage has been taken of the reconnaissances and published maps of military and geological explorations.

The principal object of post-route maps being their technical use, all superfluous detail of topography, other than the principal rivers and creeks, has been studiously omitted. The names of places are those only at which there are post-offices; the county towns or court-houses being designated by a special bolder type; the names of the counties, with their boundaries, and also those of the States and Territories are shown, and the lines of the railroads with their corporate names. The frequency of the service is shown by a system of differently colored lines representing the routes: black indicating a service of six times a week, or oftener; blue, three times a week; orange, twice a week; and red, once a week. Special offices have their supply indicated by a broken line.

The topographical Bureau of the Post-Office Department employs constantly one superintendent and a corps of skilled clerks and draughtsmen upon new maps and new and corrected editions of those already published. It is in constant correspondence with survey offices, located in all parts of the country, and with persons capable of giving information in regard to surveys, roads, explorations, and matters of topographic interest, so that no change takes place that does not soon come to be known at this Bureau, and be noted upon the maps of the Department.

XII—*MAIL EQUIPMENTS.*

Specimens of the mail-bags, pouches, and sacks in present use by the Post-Office Department, were furnished for the exhibit of the Post-Office Department in the Government building by Mr. John Boyle of No. 203 Fulton street, New York; Mr. Polydore S. Thompson of No. 338 Broadway, New York, and Mr. John C. Fetterman of Albany, N. Y., contractors with the Government. These articles are of five classes.

CLASS A.—LEATHER MAIL-POUCHES.

(Five sizes.)

No. 1. Forty-eight inches in length, and 60 inches in circumference.
No. 2. Forty-one inches in length, and 48 inches in circumference.
No. 3. Thirty-six inches in length, and 42 inches in circumference.

No. 4. Thirty inches in length, and 36 inches in circumference.

No. 5. Twenty-six inches in length, and 28 inches in circumference.

The body of these pouches is made of good and substantial leather, well tanned, weighing for sizes numbered 1 and 2, 8 ounces, and for the smaller sizes 7 ounces to the square foot; the bottoms, handles, and flaps are of good skirting leather, well tanned, and the seams well and strongly secured with the best tinned-iron rivets and burs or washers, the latter 1 inch apart.

Each of the leather pouches is provided with a metallic label case or holder.

CLASS B.—MAIL-CATCHER POUCHES.

(One size.)

Thirty-six inches in length, and 36 inches in circumference, made of closely woven cotton duck, impervious to rain.

Each of these pouches has a leather drawing-strap and buckle, so attached and arranged that it may be contracted or pursed up in the middle when hung upon the crane, from which it is taken by the catcher on a passing mail-car.

Each of these pouches has also a handle at the bottom and top, consisting of a wrought-iron ring (galvanized), one-fourth of an inch in diameter of metal, and 1¾ inches in diameter of its inclosed space.

CLASS C.—LEATHER HORSE MAIL BAGS.

(Three sizes, adapted to conveyance by horseback.)

No. 1. Body, 48 inches in length in longest part, and 21 inches in width in the widest parts, and 12 inches across the narrowest part or middle. Ends or bottoms (of elliptical form) 26 inches in length in the longest parts and 14 inches wide at the widest part.

No. 2. Body, 45 inches in length in the longest part, 18 inches in width at the widest parts, and 11½ inches across the middle or narrowest part. Ends or bottoms 24 inches in length at the longest parts and 12 inches wide at the widest part.

No. 3. Forty-two inches in length at the longest part, 16 inches in width at the widest parts, and 10½ inches across the middle or narrowest part. Ends or bottoms 20 inches in length at the longest parts and 10 inches wide at the widest part.

Each bag is to have two suitable loops, rings, straps, and buckles, so made and arranged as to connect it with the stirrup-straps of a saddle.

These bags are made of good and substantial bag-leather, well tanned, weighing for the body 7, and for the bottoms 8 ounces to the square foot; the seams sewed, are made with a welt, and secured strongly with waxed-thread stitches; when made wholly or in part with rivets, are so done as to chafe neither horse nor rider.

CLASS D.—JUTE CANVAS MAIL SACKS.

(Three sizes.)

No. 1. Forty-three inches in length and 62 inches in circumference.
No. 2. Forty-one inches in length and 48 inches in circumference.
No. 3. Thirty-two inches in length and 38 inches in circumference.

The sacks of size No. 1 are made of closely-woven jute canvas, weighing 16 ounces to the yard of 31½ inches width; each thread of the warp is composed of two spun yarns twisted together, weighing 1 ounce to 60 yards, and each thread of the woof is a single spun yarn weighing 1 ounce to 78 yards.

The sacks of size No. 2 are to be made of jute canvas weighing not less than 9 ounces to the yard of 24½ inches width, with warp and woof the same as described for size No. 1.

The sacks of size No. 3 are made of thinner canvas, weighing 4½ ounces to the yard of 19½ inches width.

The sacks of sizes Nos. 1 and 2 are made with a tabling or hem at the top 2 inches wide, upon which a sufficient number of eyelets, ten to the former and eight to the latter, are well wrought, and those of size No. 3 have a tabling or hem at the top of half an inch, without eyelets or grommets.

CLASS E.—COTTON CANVAS MAIL SACKS.

(Three sizes.)

No. 1. Of same dimensions as size No. 1, of jute, made of cotton duck weighing 12½ ounces to the yard of 22 inches width, and thread of the warp and of the woof being composed of three spun yarns twisted together, the former measuring 118 yards to the ounce, and the latter 124 yards to the ounce. The tabling or hem is 1¾ inches wide, with ten well-wrought eyelets.

No. 2. Of same dimensions as jute sack No. 2, and of same material as described for cotton canvas sack of size No. 1. Tabling or hem 1¾ inches wide, with eight eyelets wrought thereon.

No. 3. Of the same dimensions as jute sack No. 3, made of cotton canvas weighing 8 ounces to the yard of 28 inches width; each thread of the warp and woof being composed of two spun yarns twisted together, the former measuring 330 yards to the ounce, and the latter 220 yards to the ounce.

All the mail-bags, of every class, have "U. S. Mail" (with number of its size) stenciled upon them in large letters and figures, the canvas sacks so marked both inside and outside.

The mouth or opening of each pouch and bag of classes A, B, and C is so constructed as to admit of its being locked with a padlock, and, when so locked, to secure its contents from any abstraction that may be attempted without opening the lock or without any traceable mark of violence left upon the bag or pouch. The mouths of the canvas sacks are constructed with eyelets, so that they may be tied with a string. The average number of new mail-bags put in use annually in the United States is about as follows:

Class A	10,000
Class B	1,000
Class C	1,000
Class D	60,000
Class E	5,000

Specimens of all the different styles, eighteen in number, of mail locks in use since the year 1800 were placed on exhibition in a case marked *a*, Division IV, viz:

One brass mail lock, used from 1800 to 1812.
One brass mail lock, used from 1812 to 1825.
One brass mail lock, used from 1825 to 1842.
One iron mail lock, used during same period.
One brass mail lock, used from 1842 to 1852.
One iron mail lock, used during same period.
One brass mail lock, used from 1852 to 1862.
One iron mail lock, used during same period.
One brass mail lock, used from 1862 to 1870.
One iron mail lock, used during same period.
Two brass mail locks, used from 1870 to 1876.
One brass mail lock, used during same period.
Three register pouch locks, used during same period.
One street letter-box lock, used during same period.
One specimen mail lock, latest improvements.

XIII.—*THE FREE-DELIVERY SYSTEM.*

The rapid and uninterrupted growth of the postal service had caused to be felt, at an early date, the necessity for various devices by which to facilitate the delivery of letters and papers, and from time to time experiments were made, resulting in slight improvements in the forms and arrangement of general-delivery cases of "wheels," and in the style of private letter-boxes.

In 1862 there existed, in a number of cities, a "penny post," a paid carriers' delivery, the carriers remunerating themselves by the collection of a voluntary fee of from 1 to 2 cents on each piece of mail matter delivered by them. In five cities this service had the partial recognition of the Post-Office Department, while in the others it was altogether a local arrangement.

Free delivery, as a system, was first put in operation in the United States, with the sanction of law, July 1, 1863, in compliance with an order from the Postmaster-General, establishing it in forty-nine cities under the provisions of an act of Congress, approved March 3, 1863, by which act the employment by the Department of letter-carriers at regular salaries, to be paid from a fund appropriated for that purpose, was authorized, and the inauguration of the system in such cities as might be designated by the Postmaster-General was provided for. At the date of the passage of this act a similar service existed in France, Austria, the United Kingdom of Great Britain and Ireland, Prussia, Belgium, Switzerland, Italy, The Netherlands, Denmark, and the Hanseatic cities.

A paragraph from the order above referred to will partially explain the views and expectations then entertained:

> It is supposed by some to be an error to give increased accommodations to the public, without increased expense, when our revenues are deficient. I reason otherwise. Correspondence grows in proportion to the facilities afforded for carrying it on, so that, if we provide for prompt deliveries and prompt mailings of letters, we shall greatly increase our income. To this end we should have, not only frequent deliveries, but must collect promptly from boxes, put up throughout the city, so as to bring the post-office to every one's door.

It was further predicted that "free delivery," properly organized and conducted, would greatly diminish the number of letters forwarded to the dead-letter office as "not called for," many of which failed to be received by the persons addressed by reason of having been misplaced in large general-delivery cases.

The first official record of the progress of this service is to be found in the annual report of the Postmaster-General for the fiscal year ended June 30, 1864, which states the number of free-delivery post-offices in operation to be 66, the number of letter-carriers 685, and the cost of the service for that year to be $317,061. During the first year of its existence, the new service, in a number of cities, had been misunderstood by the public and the post-office officials; the latter in some instances not being in accord with the policy of the Department in regard to this matter, and the resulting mismanagement and inefficiency was so widespread as to render the system for a time extremely unpopular. At the close of the following year, June 30, 1865, the number of free-delivery offices had been reduced to 45. During the next year only one was added to the list, making the number 46 in 1866.

Through increased efficiency and zeal in both general and local management, and through improvements in equipments, furniture, and fixtures, the service gained in popularity during each succeeding year to such an extent that applications were from time to time received for its extension to cities which did not possess it. These applications were granted in the case of all cities whose population was large enough to warrant the establishment of the system. At the present time it is estimated that 75 per cent. of the delivery service in cities having a population of 20,000 and upwards is performed by letter-carriers. In the large cities the facilities thereby afforded for local correspondence have long been appreciated, and no inconsiderable portion of the postal revenues is derived from the free-delivery service in those cities.

The annual reports of 1865 and 1875 show the number of free-delivery offices in those years to have been 45 in the former year and 87 in the latter, an increase of 42 offices in ten years. The number of carriers employed during those years was 757 and 2,195, respectively, and the cost of the service $448,664 and $1,880,041. While there is no record of income from local delivery in 1865, it was reported in 1875 at $1,974,559, a very large proportion of which is believed to be the result of the facilities for local correspondence afforded in large cities by the free-delivery system.

The stamp division of the Post-Office Department reported $12,847,437 as the proceeds of the sales of stamps and stamped envelopes in 1865, and $25,477,511 in 1875, an increase of nearly 100 per cent. in ten years. As the rates of postage have been in some cases reduced, it necessarily follows that there must have been a much larger increase in the amount of mail matter handled. The number of dead letters reported as received at the "dead-letter office" in 1865 was 4,377,087, and in 1875 as 3,628,808. Had the number of dead letters increased during the ten years referred to in a ratio corresponding to the increase in the sales of stamps and stamped envelopes, the number of such letters received would have reached 8,500,000 in 1875, showing a falling off of nearly 5,000,000 letters in the business of the dead-letter office. To this result the free delivery system has in no small degree contributed.

XIV.—*THE POSTAL MONEY-ORDER SYSTEM.*

An office, called the "Centennial branch post-office of Philadelphia, Pa.," was, by order of the Postmaster-General, opened for business on the 10th day of March, 1876, in the United States Government Exhibition building at Fairmount Park, Philadelphia, Pa. The statistics of this office during the continuance of the International Exhibition, from May 10 to November 10, 1876, inclusive, are given elsewhere in this appendix. The money order, like the other divisions of this office, though established for the accommodation of the exhibitors, officers, attendants and visitors at the Exhibition, was intended also to illustrate the practical workings of the money-order system.

The domestic money-order system of the United States went into operation November 1, 1864, in pursuance of an act of Congress approved May 17 of the same year. By this act $100,000 was appropriated from the public treasury, out of which to defray the expense of inaugurating the system.

At the close of the fiscal year ended June 30, 1865, eight months after the commencement of the business, the Auditor of the Treasury for the Post-Office Department reported 142 money-order offices in operation, at which 74,277 orders, amounting to $1,360,122.52, had been issued, and 70,573, amounting to $1,291,972.22, had been paid. The orders repaid during the same period amounted to $21,784.86, and the fees received for the issue of orders to $11,534.90. The expenses were $7,047.97 in excess of emoluments. The orders issued averaged $18.31 each, and the fees 15.53 cents each, or 8½ mills to the dollar. The expenses averaged 25.02 cents to each order issued, or 13.66 mills to the dollar.

The first complete fiscal year of the system closed with 473 money-order offices in operation on the 30th of June, 1866. During this year 243,609 orders, amounting to $3,977,259.28, were issued, and 233,124, amounting to $3,851,839.49, were paid. The orders repaid amounted to $52,050.73, and the fees received to $35,799.98. A net revenue of $7,138.79 was declared by the Auditor, an amount of $90.82 in excess of the deficiency of the previous year. The orders issued averaged $16.32 each, and the fees received 14.69 cents each, being 9 mills to the dollar. The expenses averaged 11.77 cents to each order issued, or 7.21 mills to the dollar.

The last complete fiscal year of the system closed with 3,697 money-order offices in operation on the 30th of June, 1876. During this year the number of orders issued was 4,998,600, amounting to $77,035,972.78, and the number paid was 4,947,685, amounting to $76,632,571.45. The amount of orders repaid was $473,767.40, and of the fees received $645,699.40. The net revenue was $190,770.84. The orders issued averaged $15.41 each, and the fees 12.92 cents each, or 8⅜ mills to the dollar. The average expenses were 9.13 cents to each order issued, or 5.92 mills to the dollar.

A comparison of the above data shows the ratio of increase during the ten years to be as follows:

In the number of offices as 1 to 7.81.
In the number of orders issued as 1 to 20.48.
In the amount of orders issued as 1 to 19.37.
In the number of orders paid as 1 to 21.22.
In the amount of orders paid as 1 to 19.90.
In the amount of orders repaid as 1 to 9.10.
In the amount of fees received as 1 to 18.03.
In the amount of net revenue as 1 to 26.72.

During the 11⅔ years since the inauguration of the system, being from November 1, 1864, to June 30, 1876, inclusive, the total number of orders issued was 27,066,100, amounting to $466,754,758.14, and the number paid 26,847,993, amounting to $462,087,088.81. The amount of orders repaid was $3,322,560.90, and the fees received $3,254,404.35. The aggregate net revenue, after deducting the deficiency of the first eight months, was $928,092.68. The orders issued averaged $17.24½ each, and the fees 12.02 cents, being 6.97 mills to the dollar.

The average annual issue of orders since the commencement of the system has been 2,319,380, and the average amount thereof $40,007,535.27. The average annual receipt of fees has been $278,948.94, and of net revenue $80,759.02½.

Since the commencement of the system 112,683 duplicate orders have been issued, being at the average of 9,658.5 per annum, or one duplicate for every 240 orders issued. Of this number 109,344 were in lieu of orders reported to have been lost in the mails, 1,369 in lieu of orders lost or destroyed while in the hands of remitters, payees, indorsees, 59 in lieu of orders burned in the mails, 5 in lieu of orders lost by reason of the robbery of post-offices; 70 were issued to remitters in lieu of orders payable to persons, ascertained to be engaged in obtaining money through the mails by means of false or fraudulent pretences, promises, or representations contrary to law; 1,636 in lieu of orders which had become invalid by reason of their failure to be presented for payment prior to the expiration of one year after the date of their issue, and 200 in lieu of orders invalidated by reason of having received more than one indorsement.

Money-order post-offices are divided into two classes. Those of the first class are depositories of the surplus funds which accumulate at offices whose receipts exceed their disbursements. All offices not designated as depositories are known as of the second class.

For convenience in the transfer of funds from the issuing offices to the great paying centers certain of the larger post-offices whose location is suitable are designated as such depositories. These depositories retain only funds sufficient to meet their disbursements, and forward their surplus to New York, the central depository of the system.

During the ten years previous to the close of the last fiscal year $331,385,536.16 of surplus funds were transferred from issuing to paying offices, the greater part of which was currency forwarded through the mails in registered letters, being an annual average of $33,138,553.62. The ascertained losses sustained by the Post-Office Department during the same period by reason of the failure of such remittances to reach destination amounted to $39,507.54, an average of $3,950.75 per annum, or less than $\frac{12}{1000}$ of 1 per cent. upon the gross amount of the remittances. It appears also that, during the first half of the period above referred to, the remittances amounted to $87,769,495.92, and the losses to $24,542.34, while during the last half the amount of the remittances was $243,616,040,040.24, and of the losses $15,498.20; the losses during the first half being $\frac{28}{1000}$ of 1 per cent. of the amount remitted, and during the last half only a little over $\frac{6}{1000}$ of 1 per cent. Prior to July 1, 1871, no complete account was kept of remittances reported missing, where such cases were finally adjusted without loss to the Department. During the five years ended June 30, 1876, the cases under consideration numbered 171, amounting to $32,285 62. Of these the amount of $15,498.20 was allowed to the credit of the remitting postmasters; $9,734.94 was recovered by special agents of the Department; $2,090 was charged to the remitting postmasters through whose negligence the loss occurred, and 24 cases, amounting to $4,963, are still unsettled.

Offices east of the Rocky Mountains at which the disbursements exceed the receipts are allowed credits with the postmaster at New York, from time to time, as the exigencies of their business may require, to meet such deficiencies, and a limited number of blank drafts are furnished with which to draw against these credits. Such offices in the Pacific States are supplied by the postmasters at San Francisco, Cal., and Portland, Oreg. The total amount of funds furnished from the three offices named since June 30, 1869, is $36,634,574.33.

Prior to July 1, 1871, no complete separate accounts were kept of the final disposal of cases of orders reported erroneously paid, unless actual loss occurred. In cases where actual loss did occur to the Department, it was charged as a miscellaneous item. Since that date 242 cases of alleged erroneous payment, amounting to $6,610.68, have been under consideration. In 33 of these, amounting to $1,031.94, the loss was sustained by the Department; in 6½, amounting to $147.73, by the remitter, through whose carelessness the loss occurred; in 11 cases, amounting to $243.88, by the payee; in 83 cases, amounting to $2,084.45, by the paying postmaster, by whom proper precautions were not taken in the identification of the payee; in 72 cases the amount, $2,032.07, was recovered by special agents of the Department; one-half of the amount of an order, $2.50, was refunded by the issuing postmaster, who was jointly liable with the remitter for the loss; in 4 cases the amount, $75.45, was subsequently ascertained to have been rightly paid; and 32 cases, amounting to $992.66, are still unsettled.

The first arrangement between the United States and a foreign country for an exchange of postal money-orders was made with the Swiss Government on the 12th day of October, 1857, but the details were not fully agreed upon until the 2d day of July, 1869, nearly two years later, when an international exchange office was established at New York, in the United States, and a corresponding one at Basle, in Switzerland, for the exchange of money-orders by lists. In pursuance of the final agreement, the system was put in operation September 1, 1869, since which time, up to the close of the last fiscal year, a period of six years and ten months, 16,854 orders, amounting to $448,665.05, were issued in the United States for payment in Switzerland, and 5,538 orders, amounting to $152,117.61, issued in Switzerland, were paid in the United States. The amount of orders repaid was $1,280.56, and the amount of fees received $9,784.23. The revenue for the last fiscal year has not yet been ascertained by the Auditor; it is estimated at $800; for the previous years it amounted to $5,363.57, making the total, including the above estimate, $6,163.57, since the commencement of the system. At the present time 179 post-offices in the United States are authorized to issue and to pay Swiss international money orders.

A convention between the United States and the United Kingdom of Great Britain and Ireland was concluded on the 30th of June and 27th of July, 1871, in pursuance of the provisions of which the exchange of money-orders between those countries was commenced, through the offices at London and New York, on the 2d of the following October, from which date to the close of the last fiscal year, a period of four years and nine months, 308,911 money-orders, amounting to $5,770,960.15, were issued in the United States for payment in the United Kingdom, and 72,136 orders, amounting to $1,349,503.53, issued in the latter country, were paid in the United States. The amount of orders repaid was $18,425.03, and of fees received was $173,722.20. The revenue for the last fiscal year has not yet been ascertained; it is estimated at $900. For the preceding years it was $32,955.69, making a total, including the above, estimated, $33,855.69 since the commencement of the business. At the present time 1,013 offices, authorized to transact British international money-order business, are in operation in the United States.

On the 22d day of July, 1871, a convention was concluded with the postal authorities of the German Empire, in pursuance of which the exchange of money-orders with that country was commenced October 1, 1872, through exchange offices established at New York and Cologne, Germany, from which date to the close of the last fiscal year, a period of three years and nine months, 125,489 money-orders, amounting to $2,649,061.91, have been issued in the United States for payment in the German Empire, and 85,092 such orders, amounting to $2,195,754.40, issued in the latter country, have been paid in the United States. The amount of orders repaid was $13,227.70, and the amount of fees received $72,898.10. The amount of the revenue for the last fiscal year has not yet been reported by the Auditor. It is estimated at $8,000. For the preceding years it was $24,742.58, making a total, including the above estimate, of $32,742.58 since the commencement of the business. There are six hundred and thirty-one money-order offices in the United States authorized to transact German international business.

June 8 and 23, 1875, a convention with the postal authorities of the Dominion of Canada was signed, under the provisions of which the exchange of money-orders with that country was commenced on the 2d day of the following August. Since that time, previous to the close of the last fiscal year, a period of eleven months, 8,695 money-orders, amounting to $186,995.74, were issued in the United States for payment in the Dominion of Canada, and 11,783 such orders, amounting to $232,625.57, issued in the latter country, were paid in the United States. The amount of orders repaid was $1,447.14, and of fees received $4,284.85. The amount of revenue has not been reported by the Auditor; it is estimated at $300. Three hundred and sixteen offices are in operation in the United States at which Canadian orders are issued and paid.

Negotiations are now pending for the establishment of a system of money-order exchange with France and also with Italy.

At the present time all money-orders, domestic as well as international, are limited to $50, in the paper currency of the United States, and no more than three domestic orders, payable to the same payee, are allowed to be issued in one day to the same remitter. The system being intended chiefly for the accomodation of persons desiring to remit small sums of money, this restriction was imposed upon the issue of orders for the purpose of preventing the use of the system in large business transactions, as well as to provide against the accumulation of considerable sums of money at small issuing offices, remote from safe methods of transportation, and to protect postmasters from sudden calls for the payment of large amounts of orders at small interior paying offices, where the retention of considerable balances is deemed unsafe.

The expenses of the system since its inauguration have been paid partly from its proceeds and partly out of appropriations made by Congress. Of the former class are postmasters' commissions, allowances for clerk-hire in post-offices, salaries and expenses of special agents of the system, stationery and incidental expenses in money-order account in post-offices, and miscellaneous allowances for losses of various kinds. Of the latter class are salaries in the office of the superintendent of the money-order system, and in the money-order division of the office of the Auditor of the Treasury for the Post-Office Department in Washington, the cost of books, blanks, and printing, furnished by the Public Printer, and of stationery furnished by the Post-Office Department. If all the expenses of the system had been made payable out of its proceeds, in all fiscal years, except three, prior to the last, a deficiency would have occurred, by far the greater part of which would have appeared during the years ended June 30, 1873, 1874, and 1875, during which a reduced schedule of fees was in operation, under the act of June 8, 1872, the effect of which was to stimulate the sale of orders for small amounts at the expense of the Government.

In his annual report for 1874 the Postmaster-General recommended the enactment by Congress of such a schedule of fees as would make the system self-sustaining, and subsequently the act approved March 3, 1875, established the present schedule, viz: On all orders not exeeding $15, 10 cents; over $15, and not exceeding $30, 15 cents; over $30, and not exceeding $40, 20 cents; over $40, 25 cents. This act took effect July 1, 1875, and during the first year of its operation the increase in the amount of fees received over the amount of the preceding year has been equal to 31 per cent., notwithstanding a falling off of one-half of 1 per cent. in the amount of orders issued. Had all expenses of the preceding year been made chargeable to the proceeds of the business, a deficiency of over $53,000 would have occurred, while, had all the expenses of the last year been made so chargeable, there would still have been a surplus (including the profits of the international business) of more than $12,000.

By a law of Congress the net profits arising from the sale of money-orders are made a part of the postal revenue, and are turned over to the Treasurer of the United States, subject to the order of the Postmaster-General.

In the office of the superintendent of the money-order system in Washington a force of twenty-five clerks, messengers, and laborers is at present employed, at an expense of $35,000, and in the money-order division of the office of the Auditor a force of eighty-five is employed, at an expense of $95,000 per annum. The cost of blanks, books, printing, and stationery furnished in Washington is about $60,000 per annum.

New York, as before stated, is the international exchange office, on the part of the United States, for the exchange of money-order lists with all foreign countries. In this office an average force of twenty-three clerks is employed exclusively on international exchange business, at an annual expense, at the present time, of $29,000. In the case of Canada only, owing to the extreme length of frontier bordering on the United States, additional exchange offices are in operation. Seven such have been designated, viz, Bangor, Me., Boston, Mass., Buffalo, N. Y., Detroit, Mich., Ogdensburg, N. Y., Portland, Oreg., and Saint Paul, Minn.

REPORT

ON THE

PARTICIPATION OF THE DEPARTMENT OF AGRICULTURE

IN THE

INTERNATIONAL EXHIBITION OF 1876,

HELD AT

PHILADELPHIA, PA.

By WILLIAM SAUNDERS, ESQ.,

Superintendent of Gardens and Grounds of Department of Agriculture, and Representative of the Department at the Exhibition.

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OFFICERS OF THE DEPARTMENT OF AGRICULTURE, 1876.

Hon. Frederick Watts	Commissioner.
Frederick Watts, Jr.	Chief Clerk.
B. F. Fuller	Disbursing Clerk.
Townend Glover	Entomologist.
William Saunders	Superintendent of Gardens and Grounds and Horticulturist.
J. R. Dodge	Statistician.
Dr. William McMurtrie	Chemist.
R. L. Packard	Assistant Chemist.
Dr. George Vasey	Botanist.
Thomas Taylor	Microscopist.
Andrew Glass	Superintendent of Seed Division.
J. B. Russell	Librarian.

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DEPARTMENT OF AGRICULTURE.

The Department of Agriculture is now in the fifteenth year of its existence as a distinct branch of the operations of the Government. For many years previous to the organization of this Department the agricultural interests of the country received the attention of the Government, in a limited degree, through the administration of the Patent Office. New and valuable seeds and plants were introduced and carefully distributed; agricultural statistics were partially collected and made available for reference; investigations relating to the habits and general history of destructive insects were prosecuted, and a large amount of information upon the general subject of agriculture was imparted to the public in essays and papers that were deemed to be instructive and valuable to farmers.

These operations, although necessarily crude and unsystematic, were widely recognized as beneficial; increased interest was manifested in agricultural improvements and experiments, which led to a frequently-expressed desire on the part of the farming population for a more comprehensive system of seed and plant distribution, a more extended investigation of the extent and value of the agricultural resources of the country, and a more permanent and systematic organization of Government aid to the leading industry of the nation.

In May, 1862, Congress responded to this general desire by the passage of an act establishing the Department of Agriculture. The general designs and duties of the Department, as defined by this act, are "to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants."

It was made the duty of the Commissioner appointed under this act, as the chief executive officer of the Department, "to acquire and preserve in his Department all information concerning agriculture which he can obtain by means of books and correspondence, and by practical and scientific experiments, by the collection of statistics, and by any other appropriate means within his power; to collect, as he may be able, new and valuable seeds and plants; to test, by cultivation, the value of such of them as may require such tests; to propagate such as may be worthy of propagation, and to distribute them among agriculturists. He shall annually make a general report, in writing, of his acts to the President and to Congress, in which he may recommend the publication of papers forming parts of or accompanying his report. He shall also make special reports on particular subjects whenever required to do so by the President or either house of Congress, or when he shall think the subject in his charge requires it." He was also empowered to employ, as their services may be needed, such persons as botanists, entomologists, chemists, and other persons skilled in the natural sciences pertaining to agriculture. The law also contemplated the publication of an annual report from the Department, to embrace such papers on agricultural subjects as might be deemed essential in furthering the general design.

In the performance of the duties thus imposed upon the Department, and in the gradual enlargement of the range of its operations, a body of assistants has been organized which now embraces a working force of about one hundred persons—specialists, clerks, laborers, and other employés.

This working force is systematically arranged in divisions, each one of which is directed by a responsible head. These divisions are the seed division, the entomological division, the horticultural and propagating division, the statistical division, the chemical division, the botanical division, and the microscopical division. Through these divisions the Commissioner is enabled to execute the various duties prescribed and contemplated in the organic act creating the Department.

THE SEED DIVISION.

The distribution of seeds is a leading feature of the operations of the Department, having for its objects the introduction and dissemination of new and improved varieties of cereals and forage plants, as well as every kind of economic plant of promising interest or of known value. An incentive is thus given to new productions, and the formation of new industries, equally to that of increased food products. The benefits obtained from mere change of seeds from one soil or climate to a different soil or climate; the advantages derived from careful selection of seeds, demonstrating that diminished crops may result from careless seed selection, as well as from deterioration or exhaustion of the soil, are some of the objects sought to be obtained by seed distribution. Even careful selection will not, in all cases, tend to improvement in seeds. In climates perfectly adapted to the habits and requirements of a plant, skill in cultural applications and judicious selection of seed will naturally tend to increased improvement as to quantity and quality of products; but when plants are introduced into climates inimical to their perfect growth gradual deterioration will invariably follow. Under these conditions the only method of insuring a succession of remunerative crops is by the introduction and use of seeds produced in climates favorable to their perfect development, and in no other way can this fact be so forcibly impressed upon farmers than that of furishing them with such seeds, so that they may reach conviction from direct personal experiments.

A further important object of seed distribution is that of testing the merit of new seeds in different climates and on a diversity of soils in one season. Seeds of new, untested varieties are placed in the hands of farmers in selected localities for cultivation who in due time report the results to the Commissioner who is thus placed in possession of data that enable him to intelligently direct future distributions. Thus every farm upon which these seeds are tested, and the results fairly reported becomes an experimental farm so far as that particular product is concerned.

The seeds are usually sent through the mails, free from all charges to the recipients. They are distributed through agricultural societies and institutions, regular correspondents of the Department, members of Congress, and in special cases to individual applicants.

THE ENTOMOLOGICAL DIVISION.

The depredations of insects constitute a most serious obstacle to the successful culture of vegetable products, and their life history is one of the most important branches of knowledge that the cultivator can acquire. The principal duties of this division are those relating to the dissemination of information regarding the natural history and habits of insects injurious to vegetation, and the best known remedies for their extermination. The reports of the Department contain a very large amount of general and special information submitted from time to time by the entomologist, embracing detailed treatises on the habits of insects that are injurious to plants, their modes of attack, the damages they inflict, and the means by which they may be kept in check or utterly destroyed. An important part of the duties of the entomological division consists in answering the letters of inquiry concerning insects that are forwarded for identification and description from all parts of the country. This special information, on special subjects of immediate importance to farmers and horticulturists, is thoroughly appreciated, and its value duly acknowledged by those thus directly benefited.

The economic museum of the Department is also in charge of the entomological division, and although it is but of a few years' growth the collection has assumed large proportions, and, being strictly agricultural in all its essential parts, it is of much interest, as well as forming a valuable auxiliary in the work of the Department. The arrangement of objects is thoroughly systematic in all its consecutive details. Representations are here to be found of all the leading agricultural products of the country. Vegetable fibers are largely represented, and specimens of the various stages of manipulation, from the raw material to the finished product, are placed side by side, whether it is woven into cloth, spun into rope, or fabricated into paper. In numbers and varieties of kinds and grades of wools and silks the collection in the museum is probably unsurpassed.

A collection of preserved birds, neatly prepared and mounted, embraces only those that are noted either for their beneficial or injurious propensities in fields and gardens; references, easily comprehended, significant of their good or bad qualities, accompany each specimen.

Representations of pure breeds and distinct varieties of domestic poultry form a series of great value.

Models from nature of the best varieties of fruits and vegetables are here numbered by the thousand; the influences of soils and climates on particular fruits are clearly demonstrated by specimens of the same varieties produced in different States and localities.

The entomological branch of the museum consists of finely colored plates and cases of preserved insects methodically arranged for reference. The details illustrate the various transformations they undergo, the plants they feed upon, and the injuries they inflict. Beneficial insects are also conspicuously placed, so that the cultivator may distinguish friends from enemies, for it is quite as important that he should as zealously strive to protect the former as to destroy the latter.

THE HORTICULTURAL DIVISION.

Some years prior to the establishment of the Department of Agriculture a garden was formed under the auspices of the Patent Office for the purposes of propagating and cultivating plants for distribution. This garden was transferred to the Department, and it has been enlarged, both in its extent and range of operations, as demanded by the increased requirements of the Department.

Among the duties charged to this division the following may be noted as prominent: The propagation and distribution of such plants as are deemed worthy of introduction for their economic value; the testing of seeds and plants in regard to their climatic adaptation, and experimenting with species and varieties of useful plants, for the purpose of ascertaining their comparative merits.

Glass structures of ample dimensions are provided for the propagation and preservation of exotic and other plants. The exotic collection is mainly confined to plants having economic value, as furnishing dyes, sugars, starches, gums, fibers, edible fruits, beverages, &c., many of which may be cultivated in this country. This collection also enhances the value of the economic museum, as it contains specimens of the plants from which the materials are produced, so far as relates to the articles of vegetable origin in that collection.

The horticultural division is also charged with the arrangement and general superintendence of the grounds attached to the Department; the erection of such structures as are required for horticultural purposes, and all operations pertaining to landscape gardening and garden architecture.

About 20 acres are appropriated to the formation of an arboretum, which is designed to include a specimen of every hardy ligneous plant, arranged in accordance with a botanical classification, combined with the development of landscape-gardening effect, so far as the combination can practically be produced.

Although the operations of this division are largely tentative they are also intended to furnish examples of results attained by processes of culture, such as the modifications effected by pruning and similar manipulations on fruit trees and other plants; the plants best adapted for hedging purposes, protective and ornamental, and modes of care and management; appliances for the propagation of plants; methods of constructing, heating, and ventilating green-houses, graperies, and conservatories; the formation and care of lawns, and other operations connected with rural improvements.

It is also the duty of the superintendent of the garden to answer inquiries directed to the Department on subjects embraced in his division.

THE STATISTICAL DIVISION.

In the act to establish a Department of Agriculture the collection of agricultural statistics was specified as one of its leading objects.

The general census taken by the Government embraced certain portions of the statistics of agriculture, such as a general statement of the principal crops, their estimated commercial value, and the leading sources of agricultural investment. But no effort was made to depict clearly the points either of production or consumption of different crops or their significance in regard to the internal commerce of the country; no exhibit that would show the cost to consumers in different sections, the price of farm labor and its relation to the interests of the producer or consumer. These and many other leading questions can only be solved by statistical data carefully collected and intelligently used.

The statistical division is charged with the duties of collecting and publishing this statistical matter; but instead of offering decennial returns, it makes a monthly collection of data, obtained through a corps of corespondents, numbering several thousands, so situated as to recognize every county in the United States from which information is sought to be procured. These correspondents are appointed with reference to their facilities for obtaining authentic information and their ability to insure impartiality and accuracy. They are informed monthly by circular letters in regard to the specific data required, and the answers are returned in accordance with transmitted instructions. The acknowledged value of the accuracy of data thus obtained clearly proves the excellence of the system adopted; and whether it is desired to ascertain the amount of acreage in particular crops; the condition of crops as regards growth, maturity, or yield at certain periods; the numbers and local values of horses, cows, sheep, oxen, or other cattle; the prices of labor in different localities, or answers to any other series of interrogatories, the information is promptly returned in the time and manner required. The data thus acquired is immediately prepared for publication in the monthly report of the Department.

THE CHEMICAL DIVISION.

The work of the chemical division consists in the collection and dissemination of information relating to the practical application of the results of chemical investigations on the nature and properties of soils and their products; in determining the value of natural fertilizers of mineral or of vegetable origin; the kinds of fertilizers, and their value in reference to the increase of special products in plants, and such other investigations and analyses as may tend to promote agricultural interests and progress.

Soil analyses are directed more particularly to the investigation of causes immediately injurious to vegetation, with a view to the determination of practical methods for their removal. The relative values of the fertilizing properties of peat, muck, marls, and other natural deposits are determined, and the results made known through the reports of the Department.

Valuable investigations are made in reference to the exact specific relations that exist between plants and soils upon which they grow, as influencing the increase of the special products for which they are cultivated, such as sugar in the beet, and wine-making constituents in the grape.

The chemist is provided with a well equipped laboratory, conveniently fitted for the prosecution of his studies; a carefully-selected cabinet of geological and mineralogical specimens is attached to this division, illustrative of the formation and physical condition of soils, and otherwise contributing towards the solution of questions submitted by correspondents, whose letters of inquiry on these and other subjects relating to agricultural chemistry largely occupy his attention and consideration.

THE BOTANICAL DIVISION.

The botanical division of the Department is charged with the collection, classification, and preservation of the herbarium. This herbarium is composed in part of the large botanical collections made by the various Government exploring expeditions, which had been accruing during many years in the natural-history collections of the Smithsonian Institution, and which were transferred to this Department several years ago. These, with donations from foreign governments and private individuals in this and other countries, together with the additions constantly being made by the botanist of the Department, comprise a herbarium of great extent and value, which is duly being arranged, classified, and prepared for permanent preservation, in order to be available for reference and study.

In addition to that of the general arrangement and care of the herbarium, it is the duty of the botanist to answer all inquiries for information on questions relating to practical and economic botany which are presented to the consideration of the Department.

THE MICROSCOPICAL DIVISION.

The importance of microscopic investigations to the interests of the farmer and gardener is now fully recognized. The diseases of plants are yet imperfectly understood, and what is definitely known concerning their pathology is largely, if indeed not wholly, due to the revelations of the microscope.

The microscopical division is the latest addition to the organization of the Department, and so far the attention of the microscopist has mainly been directed to the investigation of diseases in plants of prominent importance, such as the rot in the potato, the blight in pear-tree branches, the yellows in the peach tree, leaf mildew on the grape and the rot in its fruit; onion rust, cranberry rot, and blight on orange trees and fruits; these, and other similar subjects, have been studied, and such remedies suggested as observations indicated.

There is much of promise to the agriculturist in the results of microscopic studies, especially in regard to a better understanding of the structure and life habits of the lower cryptogams. Fungoid growths are the active agents in the dissolution of plants, and whether their presence in each particular case is a cause or a consequence of disease can only be ascertained by oft-repeated observations and close, properly-directed study.

THE LIBRARY.

The Department is furnished with a very complete library of between 7,000 and 8,000 volumes, comprising standard works, scientific and practical, on all subjects directly connected with agriculture and horticulture. It is acknowledged to be one of the best libraries of its kind in the country.

It is in regular receipt of the transactions and reports of leading agricultural, horticultural, and pomological societies, and of scientific associations in this country, as well as those of similar institutions in Europe and other foreign countries.

Domestic and foreign periodicals and papers germane to the interests of the Department are daily received.

Through its extensive official correspondence the Department disseminates a vast fund of information on specialties connected with the wide range of subjects coming directly under its administration, which, although never published, is of significant value, as bearing directly upon specific questions of vital interest to the productive industries of the country.

WILLIAM SAUNDERS,
Representative of the United States Agricultural Department.

WASHINGTON, D. C., *November*, 1876.

MUSEUM AND ENTOMOLOGICAL DIVISIONS.

MUSEUM AND ENTOMOLOGICAL DIVISIONS.

COLLECTION OF GRAINS, SEEDS, ETC., WITH SOME OF THEIR MANUFACTURES.

In this collection are shown between 800 and 900 specimens of the cereal products of the United States, selected expressly for the exhibition by agents of the Department, from nearly every State in the Union, and from various portions of the State. These are arranged in glass jars one foot in height, and so placed that a comparison can be made of well-known varieties from different States.

The 125 samples of Indian corn, or maize, are exhibited upon black tablets and arranged similarly to the jars of grain, so that ready comparison can be made, for example, between Northern and Southern grown corn.

To more fully complete the grain exhibit and to carry out the original plan of a strictly agricultural and economic museum, upwards of 100 samples of manufactured products of cereals are shown, illustrating processes of manufacture in great variety, including the fancy products, which are rapidly making their way to all well-supplied tables.

MAINE.

1–9. James W. Ambrose, Aroostook County:

Lost Nation, ———, and India wheat; six-rowed barley; Canada, Potato, and Russian oats; Marvaska beans and Dutton corn.

10–23. Robia Whitney, Cumberland County:

Lost Nation, Prolific Spring, Lancaster red-chaff winter and Mammoth Red Spring wheat; two-rowed and Probstier barley; Early Yellow, White Polish, Hulless, and Black Spanish oats; Silver-skin buckwheat; Early Improved beans and King Philip corn.

24–33. W. W. Johnson, Penobscot County:

Tappahannock, Lost Nation, and India wheat; Native Winter and Spring rye; Birlie oats; Rice-pop, ———, and Early Canada corn.

34–41. H. G. O. Smith, York County:

Lost Nation, White Italian, and Tappahannock wheat; Poland and Swedish oats; Pea; Bears Hoop and Canada corn.

NEW HAMPSHIRE.

42–55. G. H. Gilbert, Cheshire County:

Probstier and Sawyers' barley; Sand, Schoenen, Canada, and Sawyer oats; Sawyer, White Pearl (pop-corn), Holden, Griffin, Claremont, Red Cob (sweet), Crosby Early (sweet), and Excelsior corn.

56–64. William Ramsdell, Hillsborough County:

Spring wheat; Spring rye; Crosby (sweet), Putnam, Tucker, Tucker, White (pop), Rice (pop), and Tom Thumb (pop) corn.

65–77. Levi Bartlett, Merrimac County:

Fultz (winter), Putties' Red Bearded Laissette, Arnold's Hybrid, Bartlett's (spring) White (winter), Arnautka wheat; Wild Goose, or Poland rye; Australian and White Excelsior oats; White Flint (pop), Red (pop); Rice (pop), Crossby's Early (sweet), Harris' (sweet), Coral and Couch corn.

VERMONT.

78–86. L. H. Kellogg, Rutland County:

Spring wheat; White and White Winter rye; Oats, Barley; Silver Hull buckwheat; Early 8-rowed corn; Canada and Black-Eyed Marrowfat Pea; Pop-Corn.

CONNECTICUT.

87–113. T. L. Gold, Litchfield County:

Twenty-six varieties cereals received too late for exhibition.

114–130. T. G. Kingsley, New London County:

Fifteen varieties cereals received too late for exhibition.

NEW YORK.

131–144. A. J. Denniston, Steuben County:

China Tea, Lancaster red, and Treadwell wheat; White rye; 6-row Barley; Probstier, Surprise; Yellow Side oats; Buckwheat and Silver Skin buckwheat; White Flint and Dutton corn.

145–154. B. Wilbur, Dutchess County:

Wicks wheat; White and rye; Native White, Native White and California oats; Silver Hulled buckwheat; Yellow, Dutton, and Excelsior corn.

NEW JERSEY.

155–161. James D. Evans, Salem County:

(114–120.) Fultz, Mediterranean, and Golden Chaff wheat; Early Cumberland, Chester County Mammoth, White Cob and White Cob corn.

162–180. Thos. J. Beans, Burlington County:

Mediterranean, Red Straw, and Amber wheat; White rye; White oats;

White, Little's White, and Burlington County Yellow corn; Amber and Fultz wheat; Common rye; Common oats; Common buckwheat; Early Spring, Early White, York 8-Rowed White, Common Yellow, and Early Red corn.

PENNSYLVANIA.

181–184. W. O. Thurston, Bradford County:

Soule's Winter wheat; Winter rye; Yellow Side, or Mane oats; early 8-Rowed corn.

185–196. Johnson Miller, Lancaster County:

Canada White, White, Red, Garber, Stouble, or White Chaffer, Old Red, and Fultz wheat; Imported Canada, Norway, and Surprise oats; ——— and ——— corn.

197–213. F. J. Cope, Westmoreland County:

Mediterranean, Treadwell, Fultz, Red Mediterranean, and ——— White wheat; Norwell and Connecticut oats; Brown Skinned and Silver Skinned buckwheat; Flax seed; Red-Top Clover seed; Timothy seed; Yellow Flint, 8-rowed sugar, Calico, Yellow Ground Seed, and Yellow Ground Seed corn.

214–219. W. W. Brown, Clinton County:

Fultz and Black Sheaf wheats; Snow-Shoe, Schoenen, and Buckwheat oats; Triumph (sweet) corn.

220–224. J. S. Williams, Bucks County:

Amber and Mediterranean wheat; Preston, Pearson, and Improved Gourd Seed corn.

DELAWARE.

225–237. Prof. E. D. Porter, New Castle County:

Fultz and Red Mediterranean wheat; White rye; ——— buckwheat; Schoenen and White ——— oats; New England Sugar, White Pop, White Briar, White Dent, Yellow Dent, Yellow Dent and Stowell's Evergreen Sugar corn.

MARYLAND.

238–247. H. L. Rautzahn, Frederick County:

Fultz wheat; White rye; Norway and Common oats; Catoctin and Mammoth White corn; White Marrowfat and Common Field bean; Common Velvety and Sapling Clover seed.

248–256. James P. Stabler, Montgomery County:

North Carolina White, Fultz, and Tappahannock wheat; Common rye; Excelsior oats; White Field, 8-Rowed White, Mammoth Sweet, and Yellow Field corn.

257–265. Abraham De Witt, Cecil County:

Mediterranean, Fultz, and Red Mediterranean wheat; Early Yellow oats; Silver Hull buckweat; Yellow, white, Yarnall, and Yellow corn.

266–272. R. J. Willoughby, Caroline County:

Boden White and Fultz wheat; Potato oats, Maryland Flint, Smith, White, Noble, and Smith corn.

VIRGINIA.

273–284. Thomas F. Rives, Dinwiddie County:

Boughton White, Lancaster Red, and Fultz wheat; White Winter and Schoenen oats; Brown Hulled buckwheat; Velvet (early), Hicks' Prolific, and Pennsylvania Yellow maize; White Bonny-Bess beans; Black Field and Old Virginia Black-eyed peas.

285–296. C. S. Catron, Washington County:

Lancaster, Fultz, and Mediterranean wheat; Black rye; Black oats; Old Variety buckwheat; Virginia White, Kansas White, White Flint, California Yellow, Big Frederick Yellow, and Early Yellow corn.

NORTH CAROLINA.

297–304. A. C. Hartgrove, Haywood County:

Broughton, Walker, and Tappahannock wheat; Yellow Winter and Pure Ruffled oats; White Flint, China, and Pigeon River Gourd Seed corn.

305–310. John Robinson, Wayne County:

(Not known) wheat; Red Rust Proof and Black Egyptian oats; White Flint (not known), and (not known) corn.

SOUTH CAROLINA.

311–312. Felix Lake, jr., Edgefield, County.

Rust-Proof oats; White Dean corn.

313–322. James C. Brown, Barnwell County:

White rice; Red Rust Proof oats; ———; White Ground seed; White Ground Seed and Red Cob corn; Early Cow and Scheina pea.

323–326. Dr. P. Prichard, Beaufort County:

Big Grain White, Ordinary, Gold and Gopher rice.

GEORGIA.

327–336. George S. Black, Floyd County:

New Orleans Winter wheat; White Winter barley; Gray Winter, Grazing and Rust Proof oats; Little Wills, Ellison's Prolific, Hart's Early, Black Improved and Rapen Early corn.

FLORIDA.

337–342. T. R. Collins, Columbia County:

Early Red and Rust Proof oats; White or Lowland and Red or Upland rice; Gourd Seed and Yellow Field corn.

ALABAMA.

343–349. Hon. J. Waltson, Lauderdale County:

White Winter and Lancaster wheat; Winter rye; Red Rust Proof, Barbary, and Brown's Yellow oats; Houston's White corn.

350–356. D. K. Caldwell, Jackson County:

Tappahannock wheat; Rye; Black oats; Silver Hull buckwheat; Field peas; German millet; Field corn.

MISSISSIPPI.

357–368. P. H. Slepworth, Lafayette County.

Golden Chaff and Red Spring wheat; Red Rust Proof oats; (no name), Peyton King's, Sourby, Peyton King's on Ear and (no name) corn; White Sugar and Snake pea; Millet; Sorghum.

TEXAS.

369–374. W. G. Matthews, Collin County:

Red Mag Winter and Fultz wheat; Winter rye; Winter barley; Black Spring and Red Rust Proof oats.

375–382. J. T. Gains, Lamar County:

Tappahannock wheat; White Winter Scotland rye; Winter barley; Red African oats; Tuscarora and Tuscarora corn; Silver Top and Flat and Winter Globe and Flat Turnip seed.

WEST VIRGINIA..

383–389. G. W. Tabler, Berkeley County:

Lancaster and Lancaster wheat; Common rye; Lancaster wheat; Early Fallow oats; Yellow Gourd Seed and White corn.

390–402. Dr. J. T. Nicklin, Tyler County:

Red Lancaster, Premium, Iturian, White and Tappahannock wheat; Molock Winter rye; Oats; Buckwheat; White, Snowflake, Bison, Cooley, Denoon and Leghorn Yellow corn.

KENTUCKY.

403–414. J. A. Kinkhead, Hardin County:

Week's White Rough and Ready Mixed and Pennsylvania Red wheat; Small Black rye; Fox Fall and Black Norway oats; Ben Rag, Smith's White, White Dent, Lewis, Yellow Dent, and Lydan corn.

415–419. L. Moorman, Grayson County.

Swamp wheat; White rye; White oats; Field and Pearl White corn.

OHIO.

420–430. G. W. Morris, Miami County:

Tappahannock, Fultz, and Mediterranean wheat; Light rye; Spring barley; Miami Bottom, Improved Miami Valley, Yellow Upland, Tuscarora, Dutton, and White corn.

431–436. James McDowell, Starke County:

Tod, Fultz, and Vick's White wheat; Winter rye, Early Somerset oats; Starkler corn.

437–447. J. J. Rudisill, Williams County:

Winter rye; Surprise and Sumerset oats; Silver Hulled buckwheat; Marsh's Improved, Pioneer White, White Cap, Pickaway Yellow, Yellow Dent; Ninety Days, and Mammoth Yellow Dent corn.

MICHIGAN.

448–457. N. A. Clapp, Oakland County:

Diehl wheat; White and Yellow Probstier, Probstier and Black Norway oats; Mammoth Rice, Clapp's Early Large King Philip and Rednose Yellow corn; Kidney beans.

458–471. F. K. Smith, Kalamazoo County:

Ramsdell oats; Diehl wheat; Spring barley, Canadian, Surprise, Shoenen, and Poland oats; Timothy Grass seed; Medium White Field, Marrow-fat, and Butter beans; Yellow Dent, Yellow Dent and White Dent corn.

472–490. Robert Ure, Saginaw County:

Treadwell, White Mountain, and Black Sea Spring wheat; White Winter and Spring rye; Six-rowed and Russian barley; Barley, Barley White, and California oats: Northern and Silver Skin buckwheat; Rice Pop, Boston Pop, White Flint, Dutton Rowed, Yellow Dutton, Rowed, Smut Nosed, and Northern Dent corn.

491–501. S. R. Kilsey, Shiawassee County:

Diehl, Lincoln, Arnold's Gold Medal, Post, and (name not known) wheat; German and (name not known) oats; White Dent, Hackberry Dent, Farmer's Best, and (name not known) corn.

INDIANA.

502–513. L. Link, Rush County:

Swamp and Gennet Red wheat; Rye (no name); German barley; Canada and Surprise oats; Flax Seed; Navy and Cow bean; Mammoth Yellow, Flesh Colored, and White corn.

514–519. R. M. Mumford, Gibson County:

English wheat; Chevalier barley; Hinkle's Early White, Gibson County White, Medium Yellow, and Oil corn.

520–531. A. M, Sanderson, Kosciusko County:

Scott's, Lancaster, Tappahannock, and Egyptian wheat; Probstier and Turkey oats; Spring barley; Silver Hull and Common Black buckwheat; Native Yellow, Grant's White, and Speckled corn.

532–539. J. E. Paddock, Union County:

Mixed and Michigan Amber wheat; Norway oats; Buckwheat, Pop, Mammoth Sweet, Feed, and Indiana Yellow corn.

ILLINOIS.

540–546. G. C. Eisenmeyer, Saint Clair County:

Red, Tennessee May, White Tappahannock, Missouri Velvet, and Fultz wheat; Ninety-day Pop, and Steaming and Bread corn.

547–568. W. B. Derrick, Ogle County:

Twenty-one varieties cereals received too late for exhibition.

569–574. Ira Rowell, McLean County:

Somerset oats; Macon County Yellow, Macon County Yellow, White (name unknown), Yellow Dent, and Berkshire corn.

575–588. E. S. Phelps, jr., Bureau County:

Odessa, White Spring; China Tea, Early Organ-Spring, and Octo. Spring wheat; White Winter rye; Scotch barley; Northern Illinois White; White Swedish and Canada Small oats; Judson Field Branching, Pearl and Rice Pop, Rice Pop, Yellow Field and Yellow Field corn.

WISCONSIN.

589–604. W. W. Jackson, Monroe County:

Fifteen varieties grain received too late for exhibition.

605–613. J. M. Bailey, Pierce County:

Somerset oats; Diehl, Scotch Fife, and Odessa wheat; barley (no name); ——— oats; Medium Clover Seed; Early Golden Dent, and Dent corn.

614–625. Edwin Reynolds, Fond du Lac County:

Independent Spring, Arnautka, and New Canada Fife wheat; Dutch barley; German, English, and Early oats; Yellow Flint and Yellow Dent corn; Timothy seed; Early White Dent corn.

MINNESOTA.

626–632. B. F. Perry, Olmsted County:

Scotch Fife, Tea, Fife, Rio Grande, and Genesee White Winter wheat; barley (no name); Yellow corn.

633–644. G. Knight, Fillmore County:

Scotch Fife, Golden Strain, and Club wheat; Four-rowed barley; White Standard oats; Early White Field, and Sugar pea; Black Eye Early bean; Yellow Dent, White Flint; Pop (no name), and Pop corn.

645–652. L. Cray, Blue Earth County:

China Tea, White Hamburg and Fife, Mixed Black, and White oats; Yellow Dent, White Dent, Squaw, and Dakota Squaw corn.

653–659. F. W. Cady, Faribault County:

Fife, Early Sherman, and Eureka wheat; White Hamburg wheat; Brown Dent, Yellow Dent, and Yellow Dent corn.

660–669. L. B. Raymond, Stearns County:

Tea Spring, Scotch Fife, and White Spring wheat; Six-rowed barley; ———; White Norway; White Norway, and Norway oats; Six Weeks and Yellow Flint corn.

IOWA.

670–677. J. T. Miller, Hardin County:

Rio Grande Spring, White Michigan Spring, Canada Fife, and Spring Tea wheat; White Canada oats; White Dent, White Hominy and Calico corn.

MISSOURI.

678–689. Hon. William B. Ames, Johnson County:

Graham or New York Flint wheat; Common buckwheat; Flax seed; White Cane seed; Chinese sorghum; White Pop, Red Pop, White Dent, Missouri Bread, Bloody Butcher, Yellow Dent, and Early June Sugar-corn.

690–701. J. W. Steele, Platte County:

Red May wheat; White Flour, Missouri Bread, Golden Sioux, Kentucky Big Yellow, Calico, Bloody Butcher, Missouri, Early Flint, White Gourd Seed, Strawberry, Missouri Red Gourd, and Bloody Butche corn.

702–712. J. F. Hensley, Lawrence County:

Specimens received too late for exhibition.

KANSAS.

713–723. F. W. Case, Johnson County:

Red May wheat; rye (name not given); buckwheat (name not given); White Dutton corn; castor bean; timothy; millet; Kansas Yellow, Yellow Wa-ka-rusa, and White Dutton corn.

724–728. Dr. C. Williamson, Washington County:

White California and White California wheat; Norway oats; Kansas Early Red and Yellow Dent corn.

729–739. C. L. Ware, Cherokee County:

Egyptian Amber, Walker & Amber, Large May and Walker wheat; White Scotch and Oregon oats; Navy beans; Runner's Field, Large Mammoth, Our Native Yellow, and Northern Flint corn.

NEBRASKA.

740–753. J. Mutz, Cass County:

Priest Spring, Russian Club Spring, Rio Grande Spring, and Russian Club wheat; White Winter rye; common barley; mixed oats; common buckwheat; Pennsylvania Yellow Dent, Yellow Dent, Hoosier White, Yellow Dent, Yellow Dent, and Hoosier corn.

754–760. William Pachen, Richardson County:

White Octoe wheat; Silver Skin buckwheat; Ohio White, White Charles, Bloody Butcher, Flesh-color and Yellow corn.

CALIFORNIA.

761–773. J. Strentzel, Contra Costa County:

White Australian, Jones' Red Australian, White Australian, White Australian, and Sonora Club wheat; barley (no name); Chevalier and (name not given) barley; White oats; Medican Yellow corn; California Frigtrol and Brown Kidney beans.

774–783. W. G. Phelps, San Joaquin County:

Touzelle, Nonpareil, Propo, White Chili, Nonpareil, Sonora, and Pride of Butte wheat; rye (name not given); barley (name not given); Surprise oats.

COLORADO.

784–790. R. Gaines, El Paso County:

Mixed and mostly white Colorado wheat; White Colorado rye; Yellow Dent and Yellow Flint corn; Gipsie and Fultz wheat.

791–797. W. R. Fowler, Frémont County:

Mexican, Mexican, Mexican Mixed, and American corn; White Chili wheat; Colorado Red Chaff wheat.

UTAH.

798–802. Thomas Ord, Juab County:

Red Taos wheat; Two-rowed barley; Black and White Mixed and Schoenen White oats; Yellow corn.

WASHINGTON.

803–808. J. H. Wells, Stevens County:

Common Four-rowed and Six-rowed Spring barley; Surprise and Potato oats; White Australian Spring and Canada Club Spring wheat.

DAKOTA.

809–817. T. K. Hovey, Clay County:

Turkey and Michigan White wheat; barley; Mollala and Schoenen oats; Pop (name not given), Red Mixed, White Squaw, and Mixed corn.

INDIAN TERRITORY.

818–821. Rev. J. L. Murrow, Choctaw Nation:

Tit-i-ka wheat; Black oats; Choctaw Ta-ful-la and Yellow Field corn.

NEW MEXICO.

822–835. M. Rudolph, Mora County:

Lanigoza and Sonora wheat; rye; White and Black oats; Concho or Flour, White Flint, Pueblo Indian, and Yellow Flint corn; Horse beans; (2142–2145) Mexican, Parde, and Mulita beans; Black-eyed peas.

OREGON.

836–847. W. Phillips, Clackamas County:

Eleven varieties grain received too late for exhibition.

MISCELLANEOUS SPECIMENS.

848. George W. Sevier, Marion County, Missouri:

Marion County corn.

849. Hon. G. G. Dibrell, Tennessee:

Corn (name not given).

850. David McCluskey, Centre County, Pennsylvania:

Calico corn.

851–853. S. B. Stephens, New Orleans, La.:

Honduras rice, South Carolina Seed, South Carolina Seed.

854–856. D. Richardson, Harrison County, Texas:

Black-eyed peas, Texas Table pea, Texas Table pea in pod.

857. W. S. Scribner, Montana:

Chinese Seven-headed wheat.

858–860. James Small, Montana:

White Tennessee, Fancy Virginia, and Red Tennessee pea-nut seed.

861. G. W. Bruckner, Monroe County, Michigan:

White Schoenen oats.

862–863. B. F. Perry, Stearns County, Minnesota:

White Diehl wheat; barley.

864–865. A. G. Conant, Genesee County, Michigan:

Diehl wheat; Yankee Dent corn.

866–869. Dr. E. Palmer, North Arizona:

Corn (grown by Mouqui Indians); same; same; same.

870. ——— ———, Orange County, New York:

King Philip (17 inches) corn.

871. Allen Dodge, Georgetown, D. C.:

(776) Thirty-two Rowed corn.

MANUFACTURES FROM WHEAT.

872–885. D. L. Shoemaker, Georgetown, D. C.:

Red winter wheat, same cleaned, Patent Process Flour, Family No. 1; Family No. 2 uncleaned middlings, cleaned middlings, middlings, ship stuff, offal from middlings, rubber dust, ordinary ship stuff, shorts, brown stuff, screenings, screenings.

886–894. Clark & Hanna, Peoria, Ill.:

Red wheat; white wheat; red wheat flour; white wheat flour; Graham flour from white wheat; flour from refined middlings; (2165–2167) purified middlings from red wheat; shorts; bran.

895–901. W. H. Tenney & Sons, Georgetown, D. C.:

Patent Process, white wheat (family) Flour; white middlings; southern red wheat (family) flour; brown middlings; ship stuff; bran.

902. George R. Hill & Co., Alexandria, Va.:

Southern breakfast wheat.

903–904. Cereals Manufacturing Company, Brooklyn, N. Y.:

Steam-cooked and crushed wheat; cracked wheat.

905–906. Nutrina Manufacturing Company, Philadelphia, Pa.:

Nutrina; southern breakfast hulled wheat.

907–908. George V. Hecker & Co., Philadelphia, Pa.:

Self-rising flour; Hecker's farina.

MANUFACTURES FROM CORN.

909–913. Beall & Shoemaker, Georgetown, D. C.:

White bolted and white unbolted corn meal; bolted and unbolted yellow meal; corn bran.

914–915. Clark & Hanna, Peoria, Ill.:

White and yellow corn meal.

916–918. C. Gilbert, Buffalo, N. Y.:

Patent gloss starch; coarse and fine hominy corn.

919–921. Glen Cove Manufacturing Company, Glen Cove, N. Y.:

Duryea's improved and satin gloss corn-starch; maizena.

MISCELLANEOUS MANUFACTURES.

922–928. Glen Cove Manufacturing Company, Glen Cove, N. Y.:

Pearl barley; Avena (or oaten grits); oatmeal; rice; rice flour; split peas; sago.

929. Clark & Hanna, Peoria, Ill.:

Rye flour.

LEAF AND MANUFACTURED TOBACCO.

This collection embraces upwards of one hundred specimens of leaf tobacco grown in a score of States, representing the tobacco crop of this country. Many of the samples were improperly prepared for shipment to the Department, and have been somewhat injured as to color in re-preparing for exhibition. It is also to be regretted that more care was not exercised in forwarding the names of varieties, though nearly all are represented.

931–933. Virginia Leaf, John M. Thomas, Montgomery County, Virginia.
934. "Big Shoe-string," Johnson County, Illinois.
935. Kentucky Leaf, K. Jameson, Hart County, Kentucky.
936–937. White Burley, William H. Tolman, Bracken County, Kentucky.
938. "Pryor's."
939–943. "Yellow Bay," "Spangle Bay," "Ground Leaf," and "Tips or Tails;" White Stem, John N. Loper.
944. Missouri Leaf, J. C. Downing, Lincoln County, Missouri.
945. Virginia Leaf, Floyd C. H., Virginia.
946. Japanese Seed, ———, Maryland.
947–948. Kentucky Mammoth, John G. Fessenger, Union County, Kentucky.
949. Connecticut Seed-leaf, R. T. Tubman, Charles County, Maryland.
950–951. North Carolina Leaf ($2.50 and $4 per pound). Dr. Bedford Brown, Caswell County, North Carolina.
952. Illinois Leaf, H. B. Watson, Livingston County, Illinois.
953. White Tobacco, G. W. McKinley, ———, Ohio.
954. Native Indian Tobacco (wild), Dr. E. Palmer, Arizona.
955–956. Golden Leaf, R. I. Smith, Caswell County, North Carolina.
957. Orinoco, J. S. Battle, ———, Tennessee.
958. Cuba Seed, James Sanders, ———, Pennsylvania.
959. Spanish.
960–963. No name or locality received. No. 830 probably from Washington.
964. Orinoco, Virginia.
965. White Stem seed, Virginia.
966. Orinoco, Virginia.
967. Belknap, ———.

968. Connecticut Seed leaf, ———.
969. Kentucky Leaf, L. Moorman, Grayson County, Kentucky.
970–972. Dark Fillers, Wrappers, Bright Fillers, Thomas F. Rivers, Dinwiddie County, Virginia.
973. No name.
974. New Hampshire Leaf, Cheshire County, New Hampshire.
975–976. Ohio Leaf, Warren County, Ohio.
977–978. White Burley, Shelby County, Kentucky.
979–983. Five samples leaf tobacco from Virginia.
984. North Carolina Leaf, J. N. Hagin, New Garden, North Carolina.
985. Virginia Leaf, Fredericksburg, Va.
986–989. Four samples Virginia Leaf, H. R. Robey.
990. North Carolina Leaf, J. M. Burnett, North Carolina.
991–995. Bright yellow, medium, good, good, brown or dull, Tips or Tails and frosted inferior, H. H. Pfeiffer, Prince George's County, Maryland.
996. Kentucky Leaf, James Pringle, Livingstone County, Kentucky.
997. Illinois Leaf, W. B. Couch, Franklin County, Illinois.
998–999. Kentucky Leaf, Blue Prior, L. W. Evans, Logan County, Kentucky.
1000. Kentucky Leaf, ———, ———, Warsaw, Ky.
1001. Virginia Leaf, Z. C. Vaughn, Buckingham County, Virginia.
1002–1003. Kentucky Leaf, No. 1 White Burley, No. 2 Yellow Trust Head, Carroll County, Kentucky.
1004. Virginia Leaf, C. A. Morton, Prince Edward County, Virginia.
1005. New Hampshire Leaf, Cheshire, N. H.
1006. Connecticut Leaf, H. Schubert & Co., Litchfield County Connecticut.
1007. Kentucky Leaf, Monroe County, Kentucky.
1008. Connecticut Leaf, ———, Litchfield County, Connecticut.
1009. Prior or Lockett, McLean County, Kentucky.
1010. Kentucky Leaf, Livingston County, Kentucky.
1011. Pennsylvania Leaf, H. Williams, Bucks County, Pennsylvania.
1012. Virginia Leaf, H. R. Robey, Spottsylvania County, Virginia.
1013. White Stem, W. F. Jackson, Amelia County, Virginia.
1014. Connecticut Broad Leaf, ———.
1015. Pure Havana seed, W. H. Compton, Bastrop, La.
1016–1017. Persian Tobacco and Twist, D. Johnson, South Carolina.
1018–1020. Maryland Leaf, yellow, red, and dull, W. P. Dorsey, Calvert County, Maryland.
1021. Missouri Leaf, John C. Downing, Lincoln County, Missouri.
1022. Kentucky Leaf, C. M. Fleming, Fleming County, Kentucky.
1023. Spanish, T. F. Patton, Pierce County, Washington.
1024–1025. No name or locality.
1026. West Virginia Leaf, Fayette County, West Virginia.
1027. No name or locality.

SAMPLES OF MANUFACTURED TOBACCO, SHOWING ALSO SAMPLES OF LEAF TOBACCO FROM WHICH DERIVED.

1028–1048. G. W. Gail & Ax, Baltimore, Md.:

Kentucky Leaf, fine cut chewing; Virginia Leaf, granulated and long-cut smoking; Maryland Leaf, smoking; Snuffs.

1049–1075. Marburg Brothers, Baltimore, Md.:

Ohio Leaf, granulated smoking; Virginia Leaf, granulated and straight-cut smoking; North Carolina Leaf, fancy brands of smoking tobacco; Maryland Leaf, smoking; Kentucky Leaf, cut and dry and granulated smoking tobacco.

1076. Virginia Leaf, plug, J. R. Pace & Co., Danville, Va.
1077. Virginia Leaf, plug, B. F. Gravely, Virginia.
1078. Virginia Leaf, Navy plug, B. F. Gravely, Virginia.
1079. Illnois Leaf, plug, Harris, Beebe & Co., Quincy, Ill.
1080. Connecticut Leaf, cigars, ———.
1081. Kentucky Leaf, fine-cut chewing, Spence Bros., Cincinnati, Ohio.
1082. Virginia Leaf, pan-cake chewing, P. M. Lyon & Co., Richmond, Va.
1083. Connecticut Leaf, cigars, ———, Connecticut.

COLLECTION OF FIBERS.

The collection of fibers, both textile and paper-making, though not as complete as might be desirable, is certainly a representative one. Over five hundred samples of wool are shown, representing the principal breeds established in this country, with their crosses of every grade. Though a majority of the samples have a growth of but ten months they are generally fine specimens, and make an exceedingly interesting exhibit. The system of illustrating the processes of manufacture, by a series of their products enables the farmer to see, in any style of piece goods, shawls, carpets, or flannels, the particular grade of wool which enters into its composition.

In the cotton exhibit 120 samples are shown, both in lint and seed, with the various processes of manufacture, and the variety of fabrics into which it is woven.

Flax and jute are shown in the same manner, together with a great variety of miscellaneous fibers, including silk, ramie, hemp, asclepias, and many of the fibers from the far West, of little utility in the arts, yet showing the resources of the country.

The paper exhibit includes about 100 samples, from the raw material to the finished paper, the manufacture of "bogus," "scrap," and "rope manilla," "straw," "book" and colored paper, "flat" and "linen" paper, besides many kinds not in general use, as the okra, spartina, yucca, ramie, &c., not omitting samples of the *first* paper manufacture—by wasps—from wood.

COLLECTION OF AMERICAN WOOLS.

1084–1124. From John McDowell, Washington County, Pennsylvania:

Silesian merino grade ram, J. McDowell; Saxony merino ewe, J. McDowell; Silesian merino ewe, J. McDowell, Saxony merino ram lambs, J. McDowell; Saxony merino of 1801, improved, by J. McDowell; black-top or Wells and Dickson merino ewe lambs, bred by J. McDowell; back-top, breeding ewes, J. McDowell; black-top yearling rams, J. McDowell; black-top breeding and yearling ewes, J. McDowell; thoroughbred American merino, Infantado, Robert Vanvoorhis; thoroughbred American merino, Infantado ewe, Robert Vanvoorhis; thoroughbred American merino, Infantado ram, Robert Vanvoorhis; thoroughbred American merino, Infantado ewe, Robert Vanvoorhis; thoroughbred American merino, Paular ewes, Robert Vanvoorhis; thoroughbred Spanish merino ewes, Robert Vanvoorhis; thoroughbred Spanish merino ram, Robert Vanvoorhis; Cotswold breeding ewes, J. McDowell; American merino breeding ewes, J. McDowell.

1125–1127. From J. W. Blacklein, Buchanan County, Missouri:

Southdown, three-fourths native; Cotswold, three-fourths native; graded Cotswold, three-fourths native.

1128–1133. From Henry C. Hallowell, Montgomery County, Maryland:

Cotswold grade; Cotswold pure bred; Cotswold and Southdown cross; Cotswold grade.

1134–1148. From C. F. Kingsbury, Grafton County, New Hampshire:

Two samples, pure bred merinos, and seven-eighths Leicester; Cotswold and merino cross; Spanish merino, and three-fourths pure; Spanish merino, pure; Cotswold.

Shropshire grade (Cotswold); pure bred Spanish merino.

1149–1151. From Edward Jessup, York County, Pennsylvania:

Common breed of sheep grown in the county; thoroughbred Southdown; grade Southdown.

1152–1156. From B. F. Perry, Olmstead County, Minnesota:

Leicester; Leicester and Cotswold, cross.

1157–1159. From James Courtney, Westmoreland County, Vermont:

Cotswold and Leicester, cross; Cotswold and Southdown, cross; Cotswold.

1160–1168. From Hon. G. Corning, Albany County, New York:

Full blood Southdown ewe; Cotswold and Southdown; Leicester ram lamb; ewe lamb; full blood Southdown ram; Leicester ram; ewe; ram; Southdown ram lamb.

1169–1174. From George Grant, Victoria, Ellis County, Kansas:

Leicester, graded Mexican, Cotswold; Lincoln; Southdown; Oxforddown.

1175–1183. From O. M. Lord, Winona County, Minnesota:

Cross, one-fourth Cotswold, one-fourth Leicester, one-half merino; Leicester and merino cross; Cotswold and merino cross; full blood Leicester; one-half Cotswold, one-half native, cross; full blood Cotswold, seven-eighths Cotswold, two samples.

1184–1187. From L. B. Thornton, Colbert County, Alabama:

Cashmere goat; Cotswold; merino, Cotswold.

1188–1190. From W. O. Thurston, Bradford County, Pennsylvania:

Seven samples merino wool.

1191. From G. Kiese, Winona County, Minnesota:

Cross Cotswold and Southdown; clip, 13 pounds.

1192–1201. From Benjamin F. Sayre, Albany County, New York:

Spanish merino and Cotswold cross, nine months growth; full blood Cotswold ram, nine months growth; lambs, Cotswold, on native coarse wool; cross Cotswold and merino; lambs, cross Cotswold, on half blood ewe; Cotswold and merino, cross, eleven months growth; five-year-old merino ram.

1202–1206. From William Williams, Davidson County, Tennessee:

Cotswold yearling ram; clip, 15 pounds; Cotswold lamb, eight months old; Leicester ewes, one year old; Leicester ewes, two years old.

1207–1209. From J. R. Hill, Williamson County, Tennessee:

Cotswold.

1210–1211. From B. M. Hoard, Nashville, Tenn.:

Cotswold.

1212–1215. From B. F. Cockrill:

Merino.

1216–1219. From S. C. Pattes, Warner, N. H.:

Cross Leicester and Cotswold; merino and Cotswold, cross.

1220–1223. From Hon. George Rea, Copiah County, Mississippi:

Cross, native and Southdown; merino improved by Southdown; sample, no name.

1224–1227. From W. H. Broaddess, Fayette, Indiana:

Cotswold and Leicester, cross; Cotswold and Southdown, cross; Cotswold and Bakewell, cross; Lincoln.

1228–1236. From John Staltes, Cowley County, Kansas:

Merino cross; full blood Spanish merino; merino grades; full blood Spanish merino.

1236–1237. From T. R. Collins, Columbia County, Florida:

Half merino; common.

1238–1241. T. S. Gold, Litchfield County, Connecticut:

Ten samples Cotswold; Southdown; Southdown, ram, two samples Southdown, ram, yearling.

1242. From James M. Doughty, Orwell, Addison County, Vermont:

Ten samples Leicester.

1243. From S. Tillson, Onawa, Iowa:

Merino grades.

1244–1246. No name or locality given:

Merino.

1247–1250. ——— ———, Wayne County, Pennsylvania:

Coarse wool; Spanish merino; Southdown; Cotswold.

1251. ——— ———, Pike County, Missouri:

Common; two-year old buck.

MANUFACTURES.

In this collection the processes of manufacture are illustrated by a series of their products, enabling the farmer to see, in any style of piece-goods, shawls, flannels, carpets, &c., the particular grade of wool which enters into its composition, and the various processes by which the special result is accomplished.

1252–1274. Series of twenty-three specimens from Lowell Manufacturing Company, Lowell, Mass., illustrating the manufacture of carpets:

Unwashed Valparaiso; washed Valparaiso; foreign washed Donskoy; rewashed Donskoy at the mill; Valparaiso and Donskoy received from the comber; same after leaving first drawing frame; same after second drawing frame; same after leaving roving frame; same, spun, doubled, and twisted; same, dyed and ready for the manufacture of Wilton and Brussels carpets; mixed wool for filling for ingrains; roving from second breaker card; roving from finished card; samples of yarn in the grease and in colors for the manufacture of ingrain and three-ply carpets; ingrain carpet completed; three-ply carpet completed; Brussels carpet completed; Wilton carpet completed.

1275–1302. Series of 28 samples from Washington Mills, Lawrence, Mass., illustrating the manufacture of shawls and piece-goods:

Shawl in various stages of manufacture from the raw wool to completed fabric; "Newport" cloth in various styles of manufacture; "honey-comb" cloth in various stages of manufacture; "winter super" cloth in various stages of manufacture; "blue cloth" in various stages of manufacture.

1303–1318. Series of 16 specimens, illustrating the manufacture of opera and other flannels, from Charles A. Stevens & Co., Ware, Mass.:

Wool in grease; wool scoured and combed; weft yarn; warp yarn; unfinished flannel (white); finished flannel (white); wool in grease (opera flannels); scoured and combed; warp yarn; weft yarn; unfinished white opera flannel; finished white opera flannel; finished colored opera flannel.

1319–1321. Samples illustrating the manufacture of stockings, manufactured by A. P. Olzendorn, Manchester, N. H.:

Raw wool, scoured and carded; spun; webbing woven; finished stocking.

ANGORA WOOL AND MANUFACTURE.

1322–1323. Samples of Angora wool, from collection of Department of Agriculture, originally sent by R. W. Scott, Frankfort, Ky.:

Angora goat fleece; Angora goat fleece colored.

1324. Sample of fleece (1431) sent by John Walker, Howard County Missouri.

1325–1326. Samples of Angora fleece, as manufactured into robes, by the Angora Robe and Glove Company, San José, Cal.

COTTONS.

1327. Extra staple upland, South Carolina.
1328. Short staple upland, D. C. De Leon, New Mexico.
1329. Goosey, E. B. Hays, Vicksburg, Miss.
1330. Extra staple upland, McCarthy, ginned, South Carolina.
1331. Tahiti seed, grown on Arkansas River.
1332. Dixon, – ——.
1333. Egyptian, G. R. Thralls, Wellborn County, Florida.
1334. Peeler extra, E. B. Hays, Warren County, Mississippi.
1335. Short staple, T. R. Spencer, New Mexico.
1336. Cotton grown in latitude 40°, W. Ewing, West Virginia.
1337. Tippora extra staple, G. Hamilton, South Carolina.
1338. Sea Island, J. N. Jones, Galveston, Tex.
1339. Fine Sea Island, Saint Helena Island, South Carolina.
1340. Moina, Lexington, Ga.
1341. Cotton grown in Pennsylvania, York County, Pennsylvania.
1342. Wild cotton, collected in South Carolina.
1343. Tumel Maki.
1344. Tumel Maki, W. H. Compton, Bastrop, La.

1345–1353. Samples from James C. Brown, Barnwell County, South Carolina:

Hunt seed, cotton grown from; Dixon; unimproved; Simpson; Rio Grande seed; Hunt seed; Rio Grande; Dickson seed; unimproved.

1354. Upland short staple, T. C. Dockeray, De Soto County, Mississippi.
1355–1356. Texas wool cotton, J. T. Gaines, Lamar, Tex.
1357. Japanese prolific, D. R. Caldwell, Jackson County, Alabama.
1358. Home improved, Felix Lake, Edgefield, S. C.
1359–1367. Nine samples from prize bales at Saint Louis Fair, 1871 (1733–1741) from Missouri, Texas, Tennessee, Alabama, Louisiana, South Carolina, Arkansas, and Mississippi.
1368–1376. Nine samples grown in Indian Territory (1742–1750) by Choctaw Nation, Maj. T. D. Griffith, agent.
1377. Upland.
1378. Miniature bale, H. J. Fulton, New York City.
1379. Texas prolific, Col. M. B. Park, Lamar County, Texas.
1380–1383. Four samples middling cotton from Tennessee.
1384–1386. Three samples green seed, J. W. Holman, Lincoln County, Tennessee.
1387–1389. Peeler and prolific, C. B. Henderson, Rusk County, Texas.
1390–1391. Upland short staple, D. Richardson, Harrison County, Texas.
1392–1397. Green seed, Java prolific and Peeler, T. C. Dockery, De Soto County, Mississippi.
1398–1405. Peeler, Dickson, and McClendin's mammoth, with samples of seed, George A. Black, Floyd County, Georgia.
1406–1408. Fouchstons, Dickson, and Simpson, B. J. Russel, Baker County, Georgia.
1409–1413. Old Petit Gulf, Improved Remessis, Georgia Prolific, Texas Burr, W. W. Ross, Dallas, Tex.
1414. Prolific, or Green Seed, John L. Taylor, Hazelhurst, Miss.
1415–1416. C. B. Crumb, Stoddard County, Missouri.
1417–1422. Hurlong Improved, Johnson and China, George G. Klapp, Concordia Parish, Louisiana.
1423. Cotton, J. F. Donaldson, Warren County, Kentucky.
1424. Peeler (saw ginned), G. Hamilton, New York.
1425. Egyptian, Conrad Bush, ———, Alabama.

MANUFACTURE.

1426–1429. Samples illustrating the domestic manufacture of cotton one hundred years ago, J. T. Gaines, Lamar County, Texas.

1430–1450. Amoskeag Mills, Manchester, N. H.:

Cotton from South Carolina, in raw state; lap-picker, or first process; carding, second process; railway-head, third process; first head-drawing, fourth process; second head-drawing, fifth process; coarse speeder, sixth process, commencing to twist; intermediate speeder, seventh process; gingham warp, ninth process, including weft, several samples; dyeing, tenth process, with the manufactures of canton flannels, ticking, denims, sheetings, &c.

FLAX SPECIMENS.

1451. Raw flax, Michael Fryer, Wilmington, Del.

1452–1453. Water and dew rotted.

1454–1470. Specimens illustrating manufacture:

Stark Mills, Manchester, N. H.; American flax tow, from the hackle; from the scutch mill; dressed line; tow sliver for roving; line roving for 16-card yarn; tow roving for 16-card yard; tow yarn, 10 card, dry spun; line yarn, 16 card, dry spun; tow yarn, 16 card, wet spun; fine yarn, 16 card, wet spun; specimens of toweling, showing completed manufacture.

1471–1487. Illustrating the manufacture of flax-cotton (a flax fiber converted material intended as a substitute for cotton).

From the collection of the United States Department of Agriculture: Twelve specimens showing various processes in the preparation of the fiber; fiber colored; cloth, including samples of fibrilla yarn, one-half cotton, one-half flax; calico, carpet, &c.

MISCELLANEOUS FIBERS.

1488–1493. Six samples of hemp in various stages of preparation, from the collection of the Department of Agriculture.

1494–1519. Series of jute samples illustrating the manufacture of jute in the United States, from the Methuen Mills, Methuen, Mass.:

Jute butts, rejections, fine; rejections, drawing sliver; butts, finished card sliver; fine, first drawing sliver; fine, second drawing sliver; butts, breaker card sliver; rejections, breaker card sliver; rejections, finisher card sliver; fine, finisher sliver; fine, breaker sliver; fine, roving; butts, bagging filling yarn; rejections, bagging filling yarn; bagging; carpets; 40-inch burlaps, horse blankets; 31½ canvas, heavy; jute crash; jute and cotton union crash; warp; twist; weft.

1520–1527. Samples of ramie bark (*Boehmeria nivea*) in various processes of manufacture, from collection of the Department of Agriculture:

Ramie stalks, bark, sample, of fiber, fabric, rope, paper.

1528–1534. Asclepias fiber in various stages of preparation, from collection of the Department of Agriculture: Stalks, fiber, fabric silk from pod; worthless as a fiber.

1535–1540. *Apocynum canabinum*, samples of a fiber used by Indians of North America for making nets and mats principally. Silks, fiber rudely prepared, half made mats, half made and completed nets, made by San Diego Indians.

1541–1548. *Yucca angustifolia* and *Y. baccata*, specimens of fiber rudely prepared from them for making mats, rope, &c., by the Indians and natives of Arizona, California, and Mexico.

1549–1550. Mesquite fiber prepared and unprepared and used by Indians.

1551. Agave, in rough state, used by Indians.

1552–1553. Mescal fiber (*agave*) and the same made into saddle-cloth, by Indians of Mexico.

1554–1557. Sisal hemp. Raw and prepared fiber, from collections of Department of Agriculture, with coarse fabric and rope. Samples from Santo Domingo, but grown in Southern Florida.

1558. Banana fiber, *musa sapientum*, prepared.

1559–1562. Abutilon avicennæ or Indian mallow; fiber in various stages of preparation, used principally for the manufacture of cheap dust brushes, in the style of feather dusters, feathers being supplied on the inside to give form to the brush.

1563. Bear grass fiber *Dasylirion graminifolium.*

1564–1565. Fiber of Southern moss, *Tillandsia*, used for making a substitute for curled hair; fiber shown in two stages.

1566. Wild nettle (*Urtica gracilis*), fiber of.

1567. Fibrous plant used by Indians.

1568–1570. Sponge cucumber and fiber, collection of Department of Agriculture.

SILK.

Only a few samples of silk are exhibited; all from the collections in the Department of Agriculture. The cocoons shown are grown in various parts of the country, and some of them have been spun by worms reared entirely on the leaves of the *maclura aurantiaca* or Osage orange. No good specimens of American silk manufacture could be obtained from American manufactures, so the specimens exhibited are not representative ones. The samples are as follows:

1571. Cocoons from worms fed on Osage orange in Kansas.

1572. Cocoons from worms fed on Osage orange, Department of Agriculture.

1573. Hybrid annual, Ed. Müller, California.

1574–1575. From Japanese eggs, L. Prevost, California.

1576. Bred by J. G. Coller, Victoria, Tex.

1577. Bred by L. Prevost, California.

1578. French annual, Ed. Müller, California.

1579. Bred by L. Prevost, California.

1580–1582. Raw silk as reeled, specimens from California, North Carolina, and Kansas.

1583–1590. Various samples illustrating processes of silk manufacture in the United States from collections in museum of the Department.

PAPER STOCK AND MANUFACTURED PAPER.

Nos. 1592–1598. "American linen."

Linen rags.—Holyoke Paper Company, Hadley Falls, Mass.:

Raw rags; cut and bleached; half reduced or "half stuff; pulp or "stuff" ready to run into paper; blank and ruled letter, note, cap, &c.

Nos. 1599–1607.—"Flat papers."

Cotton and linen rags.—Holyoke Paper Company, Hadley Falls, Mass.: Mixed cotton and linen rags; bleached by boiling in lime water; reduced to "half-stuff"; reduced to pulp; various samples of paper, as "flat cap," "flat letter," &c., used principally for writing papers and for finer kinds of printing paper.

Nos. 1608–1614. "Book and news."

Cotton rags and old paper.—John A. Dushane & Co., Baltimore, Md.: Raw material, consisting of old newspapers, paper scraps and cuttings, and colored cotton rags; bleached and reduced to "half-stuff"; reduced to pulp and ready for manufacture; stuff as it runs in the machine producing paper, being the pulp with water added; samples of 60-pound book paper.

1070–1072. ———, Baltimore, Md.:

Raw material; paper scraps and colored rags, reduced to pulp; paper used for printing newspapers.

1615–1617. *Okra paper.*—Dr. J. B. Read, Tuscaloosa, Ala.:

Raw material, consisting of stalk pods, &c., of the okra plant; samples of manufactured paper; newspaper printed upon okra paper; not yet manufactured in any quantity.

1618–1621. *Colored papers.*—Springfield Paper Company, Rainbow, Conn.:

Raw material, boiled, washed, and bleached; reduced to pulp (dried sample); manufactured papers. Used for covers of pamphlets, for colored wrapping paper, &c.

1622–1631. "Manilla."

Old manilla rope.—Askell & Smiths, Canajoharie, N. Y.:

Old manilla rope; cut and deviled; boiled and washed; same two hours in heating engine; pulp ready to run into paper; stock washed and bleached; paper will bear tensile strain of 120 pounds to the inch; used principally for flour sacks.

1632–1638. *Jute bagging, old rope, and manilla scraps.*—Dobler, Mudge & Chapman, Baltimore, Md.:

Raw material as bagging, old rope, and scraps of manilla paper; "half stuff;" pulp; unfinished and finished paper; bundle of manilla wrapping, called "scrap manilla."

1639–1645. *Jute bagging, straw, and waste paper.*—John A. Dushane & Co., Baltimore, Md.:

"Bogus manilla;" raw material, consisting of rye straw, burlaps, and gunny bagging and old paper, known as "commons"; cooked and ready for the engines; pulp ready to be "let down"; "stuff" as it runs in the machine producing paper, colored; manufactured paper, used for wrappers.

1646–1652.—Straw wrapping.

Rye straw.—John A. Dushane & Co., Baltimore, Md.:

Rye straw; cooked straw; furnished straw; half-ground straw; stuff from vat; straw wrapping paper.

1653–1657. Republic Paper Company, Springfield, Ohio:

Straw; cooked straw; half reduced; half stuff; pulp ready for manufacture; straw wrapping paper.

1658–1659. *Oat and wheat straw.*—E. S. Berthand, Golden City, Colo.:

Two samples manufactured paper.

1660. *Salt hay.*—One sample of paper manufactured by E. Young, Whippany, N. J.

1661–1663. *Spartina* (*Spartina cynosuroides*).—Woodruff & Boyd, Quincy, Ill.

Raw spartina fiber; pulp, wrapping paper. The spartina grows by the side of the Mississippi River, and can be furnished for $5 per ton. It makes a tough paper, more the texture of manilla than straw; used for wrapping.

1664–1665. Miscellaneous:

Yucca (*Yucca angustifolia*).—E. S. Berthand, Golden City, Colo.

Yucca plant, full size; bundle of paper (1097–1098). Leaves of yucca and prepared wrapping paper. Not manufactured at the present time, so specimens of pulp could not be obtained.

1666–1667. *Palmetto palm.*—J. C. Herron, ———, Fla.

Samples of palmetto leaf and paper manufactured from it. Not yet manufactured in any quantity.

1668–1669. *Ramie bark.*—American Fiber Company, New York, N. Y.

Ramie fiber; manufactured paper, 1099. Ramie bark handkerchief. J. W. Hall, donor, Washington, D. C.

1670–1671. *Bamboo cane fiber.*—Samples of fiber disintegrated by being blown against a wall, having first been heated in steam guns at high pressure; paper samples.

1672. *Wood paper.*—Paper sample; Cascade Paper Company, Penn Yan, N. Y.

1673–1674 (1075). Paper made by wasps; a genuine wood-pulp paper, used for making their nests; sample from Mississippi (1100); small wasp nest.

1675–1677. *Tissue manilla twine paper.*—Manchester Paper Mill Company, Richmond, Va.

Half stuff; pulp; paper; material not stated.

1678–1693 (1081–1086). Samples illustrating the manufacture of paper twine, and imitation rush for chair bottoms.

1694. *Sugar-cane.*—Sample of printing paper, from refuse of Chinese sugar-cane; manufactured by J. T. Budd, Cecil County, Maryland.

MODELS.

These models of fruits and vegetables are made of plaster of Paris, and painted in oil colors. They are fac-similes of specimens obtained by donation or purchase, with the intention of forming a complete collection of the horticultural products of the country, illustrated not merely by single specimens, but by a sufficient number of each kind to show the modifications effected by a wide range of soil and climate.

The arrangement in the cases is alphabetical; the nomenclature, according to Downing, to which visitors are referred for synonyms that in some cases are very numerous. For example, the apple extensively grown in the West, and properly called Buckingham, is also known by all of the following names: Equinetely, Queen or Fall, Kentucky, Lexington, or Frankfort Queen, Ladies' Favorite, Byers, Ox-eye, Bachelor King, Red Horse, Ne Plus Ultra, &c.

Several of the leading fruit-growers of the country have contributed largely of specimens for our use; among them Charles Downing, Newburg, N. Y.; Dr. Brinckle, Philadelphia; D. T. Curtis, Boston; the American Institute; New York State Agricultural Society; Lindley & Sons, Georgia; B. K. Bliss, New York; Ellwanger & Barry, Rochester, and others.

APPLES.

For convenience of comparison the Russetts, Pippins, Crabs, Pearmains, and Sweet or Sweeting apples have been grouped together in the following catalogue. It is perhaps needless to say that, except in a few cases, it has not been the object to show the largest specimens of a given variety, but to exhibit its average size and condition, so that the model shall serve as a legitimate standard of comparison:

1701. Abram—Ohio, Virginia, Kansas, Georgia.
1702. Alexander—New York (3), Oregon.
1703. Alum—Georgia.
1704. Alaska—Virginia.
1705. American Black—New York, New Jersey.
1706. Annie's Favorite—Georgia.
1707. Anonymous—New York.
1708. Aunt Peggy—Georgia.
1709. Armfield's Red—Georgia.
1710. Baldwin—New York (4), Massachusetts, Pennsylvania, Oregon (2).
1711. ——— Illinois, Maryland.
1712. Baltzby—Virginia.
1713. Beefsteak—Maine (2).
1714. Baltimore Red—Georgia.
1715. Ben Bow—Georgia.
1716. Beauty of the West—Indiana.
1717. Benoni—Pennsylvania.

1718. Belle et Bonne—New York (2).
1719. Ben Davis—Illinois, Minnesota, Pennsylvania.
1720. Bell's Early—Maine.
1721. Bemiss's Seedling—Massachusetts.
1722. Belmont—New York, Illinois.
1723. Beauty of Kent—New York.
1724. Beaver Creek.
1725. Big Romanite—Illinois.
1726. Bellflower—New York (3), Minnesota (2), Indiana.
1727. Blooming Orange—Pennsylvania.
1728. Black Coal—New York.
1729. Boone—Indiana.
1730. Bollwilliger—Pennsylvania.
1731. Boren's Winter—Georgia.
1732. Borrsdorfer—Maine.
1733. Bourassa—New York, Massachusetts.
1734. Boxford—Massachusetts.
1735. Bowman's Excelsior—Georgia.
1736. Bottle Greening—Massachusetts.
1737. Buff—North Carolina.
1738. Buel's Favorite—New York.
1739. Bush—New Jersey.
1740. Buckingham—Georgia.
1741. Brooks—Virginia.
1742. Bradford's Best—Georgia.
1743. Capp's Mammoth—Illinois.
1744. Cain—Georgia; New York.
1745. Caldwell—Minnesota.
1746. Cartwright—Virginia.
1747. Cathead Greening, Massachusetts.
1748. Carthouse—District of Columbia.
1749. Caledonian—New York.
1750. Cabbage Top—District of Columbia.
1751. Canada Red—New York (3), Oregon.
1752. Campfield—New York, Kansas.
1753. Canada Reinette—New York (2).
1754. Cathead—New York.
1755. Cayuga Red Streak—Illinois, Indiana, Kansas, New York.
1756. Cornish Aromatic—New York.
1757. Cold—New York.
1758. Colvert—New Hampshire.
1759. Cole's Black—Indiana.
1760. Congress—New York.
1761. Cheese—New York, Indiana.
1762. Chenango Strawberry—Iowa.
1763. Champlain—New York.

1764. Curiosity—Wisconsin.
1765. Cumberland Seedling—Pennsylvania.
1766. Court of Wyck—New York.
1767. Codling, English—Massachusetts.
1768. Clermont—Ohio.
1769. Cellar—Pennsylvania.
1770. Crab—District of Columbia, Virginia, Georgia, New York.
1771. Crab, Chase's, Hutchinson's—Minnesota.
1772. Crab, Beach Sweet, Transcendent—Minnesota.
1773. Crab, Siberian, Hesper Blush—Minnesota.
1774. Crab—Wake County, Georgia.
1775. Crab, Maiden Blush—Kansas.
1776. Crab, Siberian, Green, Amber—New York.
1777. Crab, Red, Small Red—New York.
1778. Crab, Large Red, Waxen—New York.
1779. Crab, Orange—Minnesota.
1780. Crab, Sweet—Pennsylvania.
1781. Crab, Hughes—Ohio.
1782. Daisey—New York.
1783. Detroit—Indiana.
1784. Detroit Red—New York.
1785. Detroit Black—Indiana.
1786. Disharoon—Georgia.
1787. Doctor—Pennsylvania, Indiana,
1788. Domine—Minnesota, New York.
1789. Duchess of Oldenburgh—New York (2).
1790. Dutch Codlin—Massachusetts.
1791. Dutch Mignonne—New York.
1792. Drap d'Or—Massachusetts.
1793. Dyer—New York.
1794. Early Bough—New York.
1795. Early Joe—New York, Maine.
1796. Early Strawberry—New York (3).
1797. Early Red Margaret—New York.
1798. Early Red Streak—Virginia.
1799. Early Harvest—Maryland.
1800. Edwards—Georgia.
1801. English Reinette—New York.
1802. Endicott—Massachusetts.
1803. Eustis—New York (2).
1804. Egg Top—District of Columbia, New York.
1805. Egg (?)—New York.
1806. Everlasting Red—New York (2), Maine.
1807. Eastern Roseau—New York (2).
1808. English Red Streak—Maryland.
1809. Equinetely—Oregon, Georgia.

1810. Elliott Seedling—Minnesota.
1811. Fall Orange—Illinois.
1812. Fall Strawberry—Pennsylvania.
1813. Fall Queen—New York.
1814. Fall River—Massachusetts.
1815. Fall Wine—Iowa.
1816. Fall Harvey—Massachusetts.
1817. Fallawater—Kansas (2), New York, Indiana, Pennsylvania.
1818. Faust—Georgia.
1819. Fameuse—Minnesota (3), New York (2), New Hampshire, Indiana.
1820. Fameuse, Striped—New York.
1821. Federal—New York.
1822. Fisher—New Hampshire.
1823. Gate—Indiana, Ohio.
1824. Garden Stripe—New York.
1825. Geneva Spice—New York.
1826. Golden Wilding—Georgia.
1827. Golden Ball—Maine.
1828. General Lyon—Kansas.
1829. Gloria Mundi—Minnesota (2), Oregon, Virginia, New York, Massachusetts, Georgia, Kansas, District of Columbia.
1830. Green Limbertwig—Georgia.
1831. Green Graft—Maine.
1832. Gravenstein—Massachusetts.
1833. Grand Sachem—Maine.
1834. Granniwinckle—New Jersey.
1835. Grimes Golden—Illinois, Ohio.
1836. Grindstone—Virginia, Georgia, Indiana.
1837. Green's Choice—Pennsylvania.
1838. Gulley—Georgia.
1839. Guilford Red—Georgia.
1840. Guilford Battlefield—Georgia.
1841. Gilliflower—Minnesota, Oregon.
1842. Gilliflower, Black—New York, Maryland.
1843. Gilliflower, Cornish—Maine.
1844. Haas—Minnesota (3), Georgia.
1845. Hays Fall—Georgia.
1846. Hawkins Chief—Minnesota.
1847. Harvest—New York.
1848. Hall—Georgia.
1849. Hawley—New York.
1850. Hamise—Minnesota.
1851. Harrison—New York.
1852. Hilton—North Carolina.
1853. Hottentot—Virginia.
1854. Howard—Pennsylvania.
1855. Hoary Morning—New York.

1856. Hoover—North Carolina.
1857. Hoyle's Greening—Georgia.
1858. Horse—Oregon.
1859. Hull Blossom—Pennsylvania.
1860. Huntsman's Favorite—Kansas.
1861. Hubbardston Nonsuch—New York (3), Massachusetts.
1862. Indiana Favorite—Oregon.
1863. Ingalls Buff—Georgia.
1864. Jefferson County—Minnesota.
1865. Jewett's Fine Red—New York, Iowa, Maine.
1866. Jeffries—Pennsylvania.
1867. Juneating—Minnesota, Illinois, Maine.
1868. Jonathan—New York (3), Illinois (3), Minnesota, Iowa.
1869. Kay—Oregon.
1870. Keim—Pennsylvania.
1871. Keswick Codling—Maine.
1872. Kilham Hill—Massachusetts.
1873. Kirk's Lord Nelson—New York.
1874. King, Tompkins County—Pennsylvania (3), Oregon, New York, Minnesota.
1875. Lady—New York (2), Oregon.
1876. Lady, Black—New York.
1877. Lady, Canada—New York.
1878. Lady, Green—New York.
1879. Lady, Double—New York.
1880. Lady Finger—Indiana, New York.
1881. Lady Kenyon—Michigan.
1882. Lady Haley's Nonsuch—Massachusetts.
1883. Lansingburgh—Ohio.
1884. Landon—New York.
1885. Laquier—New York.
1886. Lawver—Kansas.
1887. Late Strawberry—New York.
1888. Late Wine—New York.
1889. Late Bough—New York (2).
1890. Late Green—Indiana.
1891. Limbertwig—Kansas, New York, Minnesota.
1892. Lyscom—Massachusetts.
1893. Little Romanite—Indiana.
1894. Locey—New York (2).
1895. Lost.
1896. Lodge—New Hampshire.
1897. Long Stem—Ohio.
1898. Lusus Naturæ—Maine.
1899. Mahaska—Kansas.
1900. May Apple—Kansas.

1901. Maiden's Favorite—New York.
1902. Mamie's Lavorite—Georgia.
1903. Maiden Blush—New York (2), Minnesota.
1904. Male Carle—Massachusetts.
1905. Matamuskeet—Georgia.
1906. Magnum Bonum—Georgia.
1907. Menagere—New York.
1908. Miller—New York.
1909. Milam—Indiana.
1910. Melon—Indiana, New York, Pennsylvania.
1911. Minister—New York, Massachusetts.
1912. Mixed.
1913. Morton—Ohio.
1914. Moose—New York.
1915. Moor's, Winter—Georgia.
1916. Mountain Rose—Georgia.
1917. Mother—Massachusetts, New York.
1918. Murphy—Pennsylvania.
1919. Muney—Maryland.
1920. Nash—Maryland.
1921. Newville—Pennsylvania.
1922. Nickajack—Georgia (2), North Carolina.
1923. Neverfail—Minnesota.
1924. Nonpareil—Minnesota.
1925. North Carolina Greening—Georgia.
1926. North Carolina Baldwin—Georgia.
1927. Northern Spy—New York (2), Oregon (2), Minnesota, Illinois.
1928. Nuzzle-nose—Massachusetts.
1929. Ortley—Indiana, Massachusetts, New Hampshire.
1930. Oslin—New York.
1931. Oil Pippin—New York.
1932. Oil—District of Columbia.
1933. Old Bettie.
1934. Ox Noble—New York.
1935. Ox Heart—New York.
1936. Olive—Georgia.
1937. Ohio Beauty—Ohio.
1938. Ohio Nonpareil—Pennsylvania.
1939. Payne's Winter—North Carolina, Georgia.
1940. Painted Lady—Indiana, Minnesota.
1941. Pennock—Pennsylvania, Indiana, Illinois.
1942. Pennock, Red Winter—New York.
1943. Pennock, Early—Illinois.
1944. Peck's Pleasant—Massachusetts (2), Kansas.
1945. Perry Seedling—Georgia.
1946. Peach—New York.

1947. Porter—Oregon, New York.
1948. Pike—Indiana.
1949. Pigeonnet—Massachusetts.
1950. Pomme de Neige—New York (2).
1951. Pound Royal—New York, New Hampshire.
1952. Piedmont—Virginia.
1953. Pomme Royal—New York.
1954. Plumb Cider—Minnesota.
1955. Plum—Massachusetts.
1956. Pomme Grise—Minnesota, Massachusetts, New York.
1957. Pomme Grise, Seedling—Minnesota.
1958. Pryor's Red—Indiana.
1959. Primate—New York.
1960. President—New York.
1961. Priestly—Indiana.
1962. Pride of the World—Minnesota.
1963. Pumpkin Rambo—New York.
1964. Pennsylvania Wine—Pennsylvania.
1965. Polly Bright—Ohio.
1866. Pearmain, Summer—New York, Minnesota.
1967. Pearmain, Blue—Massachusetts, Iowa, Oregon.
1968. Pearmain, Russet—New York.
1969. Pearmain, French—New York.
1970. Pearmain, Royal—Massachusetts.
1971. Pearmain—Long Island, Indiana.
1972. Pearmain, Herefordshire—New York, Massachusetts, Kansas.
1973. Pearmain, White Winter—Indiana (2).
1974. Pearmain, Sweet—Oregon.
1975. Pippin, Albemarle—Virginia.
1976. Pippin, Blenheim—New York.
1977. Pippin, Bullock—New York, Indiana.
1978. Pippin, Blush—Maryland.
1979. Pippin, Cranberry—New York.
1980. Pippin, Cabbage—Virginia.
1981. Pippin, French—District of Columbia.
1982. Pippin, Fall—Oregon (2), New York (2), Massachusetts, Illinois, Minnesota.
1983. Pippin, Grand Island—New York.
1984. Pippin, Golden—New York (4), Kansas, Georgia, North Carolina, Minnesota.
1985. Pippin, Green Newtown—New York (2), Indiana.
Yellow Newtown—New York (4).
1986. Pippin, Holland—New York.
1087. Pippin, Kerry—New York.
1988. Pippin, King—New York.
1989. Pippin, Loudoun—Virginia (2).

1990. Pippin, Monmouth—New York, District of Columbia, Oregon, Kansas.
1991. Pippin, Missouri—Kansas.
1992. Pippin, Michael Henry—New York, Indiana.
1993. Pippin, Newark—New York (2), Indiana, Minnesota.
1994. Pippin, Nyack—New York.
1995. Pippin, Ohio—Ohio, New York.
1996. Pippin, Orange—Michigan.
1997. Pippin, Pemberton—Pennsylvania.
1998. Pippin, Ribston—Massachusetts (2), New York.
1999. Pippin, Ridge—Pennsylvania (2).
2000. Pippin, Streaked—New York.
2001. Pippin, Sweet—District of Columbia.
2002. Pippin, Red Sweet—Indiana.
2003. Pippin, Red Cheek—New York.
2004. Pippin, Twenty-ounce—New York (2), Minnesota, Oregon.
2005. Pippin, Titus—New York.
2006. Pippin, Virginia—Georgia, Illinois.
2007. Pippin, White—Indiana, Illinois.
2008. Queen's Pocket—Maine.
2009. Rambo—New York, Maryland, Pennsylvania, Illinois.
2010. Rambour Franc—Massachusetts.
2011. Ragan—Indiana.
2012. Ramshorn—Massachusetts.
2013. Rawle's Janet—Kansas, Iowa (2), Pennsylvania, Indiana, Minnesota.
2014. Rebel—District of Columbia.
2015. Republican—Pennsylvania.
2016. Red Race—New York.
2017. Red Astrachan—New York (2).
2018. Red Bellflower—New York.
2019. Red Romanite—Georgia.
2020. Red Cheek—Oregon.
2021. Red Limbertwig—Georgia.
2022. Red Juneating—New York.
2023. Red John—New York.
2024. Red Winter Calville—New York.
2025. Red and Green Striped—New York.
2026. Red Rance—New York.
2027. Red Doctor—Pennsylvania.
2028. Richard's Graft—New York.
2029. Ridge Gilliflower—Minnesota.
2030. Richmond—Ohio.
2031. Royal Red—Indiana (2).
2032. Roman Stem—Iowa, Indiana.
2033. Rock Rimmon—Maryland.

2034. Rome Beauty—Pennsylvania, Illinois.
2035. Romanite—Minnesota.
2036. Robeson—Georgia.
2037. Robertson—Maryland.
2038. Rolla—North Carolina.
2039. Royal Timberling—Georgia.
2040. Ross Nonpareil—Pennsylvania.
2041. Rhode Island Greening—Minnesota (2), Massachusetts, Indiana, New York.
2042. Rupe's Winter—Georgia.
2043. Russet, New York—Minnesota.
2044. Russet, Cheeseboro'—New York.
2045. Russet, Columbia—Indiana.
2046. Russet, English—New York.
2047. Russet, Golden—Minnesota (2), Oregon, Iowa.
2048. Russet, Hunt's—Massachusetts.
2049. Russet, Plattsburg—New York.
2050. Russet, Perry—Minnesota (4).
2051. Russet, Roxbury—Massachusetts (4), New York, Virginia, Oregon.
2052. Russet, Sweet—New York, Pennsylvania.
2053. Russet, Spice—Kansas.
2054. Sapson—New York.
2055. Sailley—New York.
2056. Seedling—New York (3), Massachusetts (3), Indiana (4), New Hampshire (2).
2057. Scalloped Gilliflower—New York.
2058. Seek—New York (2).
2059. Seek No Further—New York.
2060. September—Pennsylvania.
2061. Seedless—New York.
2062. Shockley—North Carolina.
2063. Sharp's Greening—Georgia.
2064. Smokehouse—Pennsylvania (2).
2065. Smith Cider—Ohio, Georgia, Indiana.
2066. Sheepnose—New York.
2067. Spitzenburgh—Minnesota, Pennsylvania, Virginia.
2068. Spitzenburgh, Sweet—New York (2).
2069. Spitzenburgh, Kaigus—Ohio, Iowa.
2070. Spitzenburgh, Esopus—New York, Massachusetts, Oregon.
2071. Spitzenburgh, Newtown—New York, Minnesota.
2072. Spitzenburgh, Flushing—New York.
2073. Spitzenburgh—New York, Kansas.
2074. Spitzenburgh Scribner—New York.
2075. Spitzenburgh French—New York.
2076. Small Hall—Georgia.

2077. Snow—New York.
2078. Spice—Massachusetts.
2079. Spice Bailey—New York (2).
2080. Spice Summer—New York.
2081. Sparhawk—Massachusetts.
2082. Spirit of the Age—Georgia.
2083. Summer Queen—New York (2).
2084. Summer Rambo—Pennsylvania.
2085. Summer Hagloe—New York.
2086. Summer Bellflower—New York.
2087. Sutton Beauty—New York.
2088. Surprise—Wisconsin, New York (2).
2089. Stark—Illinois.
2090. Styre—New York.
2091. Stroat—New York.
2092. Stannard—Illinois.
2093. Steer—Pennsylvania.
2094. Stone—Minnesota.
2095. Stephen—Georgia.
2096. Strand—New York.
2097. Saint Lawrence—Minnesota, New York, Illinois.
2098. Swaar—New York (2).
2099. Swaar, Sweet—New York, Maine.
2100. Swaar, Fall—Illinois.
2101. Sweet Greening—New York.
2102. Sweet Baldwin—Massachusetts.
2103. Sweet Pear—Minnesota.
2104. Sweet Doctor—Pennsylvania.
2105. Sweet, Bentley—Ohio (2).
2106. Sweet, Brittle—New York.
2107. Sweet, Jersey—New York (2).
2108. Sweet, Honey—New York.
2109. Sweet, Lyman—New York.
2110. Sweet, Broadwell—Ohio.
2111. Sweet, Priest's—Minnesota (2), New York.
2112. Sweet, Striped—New York.
2113. Sweet, Danvers—New York.
2114. Sweet, Bailey—Illinois.
2115. Sweet, Green—New York.
2116. Sweet, Northern—New York (2).
2117. Sweet, Holland—New York.
2118. Sweet, Ramsdell's—Illinois.
2119. Sweet, Haskell—New York.
2120. Sweet, Lane—Massachusetts, New York.
2121. Sweet, Lancaster—Pennsylvania.
2122. Sweet, Stone—Maine.

2123. Sweet, Ladies'—New York (2), Massachusetts, Ohio, Indiana.
2124. Sweet, Pound—New York (2), Minnesota, Indiana.
2125. Sweet, Tolman—Oregon, Minnesota, Indiana, Iowa, New York.
2126. Sweet, Tift's—New York (2).
2127. Sweet, White Winter—Minnesota.
2128. Sweet, Winter—Georgia, Indiana.
2129. Sweeting, Hartford—Maine.
2130. Sweeting, Munson's—New York.
2131. Sweeting, Orange—Massachusetts.
2132. Sweet Vandevere—Ohio.
2133. Sweet Mountaineer—Ohio.
2134. Sweet Wetheralls, white—Virginia.
2135. Tallow—New York.
2136. Tart Bough—New York, Pennsylvania.
2137. Tetofsky—New York (2).
2138. Tewkesbury Winter Blush—New York; District of Columbia.
2139. Thomas Red—Georgia.
2140. Tower of Glammis—New York.
2141. Turner's Green—Indiana.
2142. Tulpehocking—Kansas.
2143. Twin—Maryland.
2144. Utter's Red—New York.
2145. Van Wie—New York (2).
2146. Van Dyne—New Jersey.
2147. Vandevere—New York (4), Indiana, Illinois.
2148. Virginia Beauty—Georgia, Virginia.
2149. Virginia Greening—Indiana.
2150. Victuals and Drink—New York.
2151. Waston, Doctor—Pennsylvania.
2152. Wagener—New York (3), Kansas.
2153. Wealthy—Kansas.
2154. Winter Wine—Illinois.
2155. Winter Greening—New York.
2156. Winter Domine.
2157. Wine—Massachusetts.
2158. Winter, Sweet Paradise—Massachusetts.
2159. Wine Sap—Minnesota (2), Illinois, Kansas.
2160. Wilderness—Pennsylvania.
2161. Wilfong—North Carolina.
2162. Willow Twig—Illinois (2).
2163. William's Favorite—Massachusetts, New Hampshire.
2164. Willow—Illinois.
2165. Westfield Seek No Further—New York, Minnesota, Iowa.
2166. White Hawthornden—New York (2), Massachusetts.
2167. White Vandevere—Illinois, Georgia.
2168. White Doctor—Pennsylvania.

2169. White Bellflower—Illinois.
2170. Unnamed—New York (11), Oregon, Minnesota (4), Massachusetts (3).

PEARS.

2171. Abbott—New York.
2172. Adele St. Denis—Massachusetts.
2173. Althorpe Crassane—New York.
2174. Ambrette—Massachusetts.
2175. Amire Johannet—New York.
2176. Ananas d'Ete—New York (4), District of Columbia.
2177. Andrews—New York, Massachusetts.
2178. Angora—New York.
2179. Angleterre Noisette—Massachusetts.
2180. Arbre Courbe—Massachusetts.
2181. Arch Duke Charles—Massachusetts.
2182. Assene—Pennsylvania.
2183. Autumn Bergamot—New York.
2184. Bartlett, N. H.—New York.
2185. Baronne de Melo—District of Columbia.
2186. Beurre Beauchamp—Massachusetts.
2187. Beurre Bosc—New York, Massachusetts.
2188. Beurre Bolwiller—Massachusetts.
2189. Beurre Bronze—New York.
2190. Beurre Clairgeau—Massachusetts, Maryland, District of Columbia.
2191. Beurre d'Aremberg—Massachusetts (2), New York, District of Columbia.
2192. Beurre d'Angleterre—New York.
2193. Beurre d'Anjou—Massachusetts (3), Oregon, District of Columbia.
2194. Beurre d'Alençon—Massachusetts.
2195. Beurre d'Amanlis—District of Columbia.
2196. Beurre de Beaumont—Massachusetts.
2197. Beurre de Caen—New York.
2198. Beurre de Elber—New York.
2199. Beurre Defais—District of Columbia.
2200. Beurre de Gens—Massachusetts.
2201. Beurre d'Hardenpont—New Jersey.
2202. Beurre de Printemps—Massachusetts.
2203. Beurre de Sterkman—New York.
2204. Beurre Diel—Massachusetts (4), Pennsylvania, New York.
2205. Beurre Duquermes—Massachusetts.
2206. Beurre Duval—Massachusetts (2).
2207.
2208. Beurre Giffard—Massachusetts, District of Columbia.
2209. Beurre Goubalt—New York.

2210. Beurre gris de Luçon—Pennsylvania.
2211. Beurre gris d'Hiver—District of Columbia, New York.
2212. Beurre Haggerston—New York.
2213. Beurre Hardy—District of Columbia.
2214. Beurre Knox—New York.
2215. Beurre Langlier—Massachusetts (2).
2216. Beurre Longelieur—District of Columbia.
2217. Beurre Preble—Massachusetts.
2218. Beurre Ranz—Massachusetts (2), New Hampshire.
2219. Beurre Samoyeau—New York.
2220. Beurre Sprin—Massachusetts.
2221. Beurre St. Quentin—Massachusetts.
2222. Beurre Superfin—Massachusetts, New York, District of Columbia.
2223. Beurre Thonin—Massachusetts (2).
2224. Beurre Van Marum—New York.
2225. Beurre Van Mons—New York.
2226. Belle Apres Noel—Massachusetts.
2227. Belle Alliance—Massachusetts.
2228. Belle de Bruxelles—New York.
2229. Belle de Bois—Pennsylvania.
2230. Belle de Martigne—Pennsylvania.
2231. Belle de Thouars.
2232. Belle de Flandres—New York.
2233. Belle Excellent—Massachusetts.
2234. Belle et Bonne—Massachusetts.
2235. Belle Epine Dumas—Massachusetts, Pennsylvania.
2236. Belle Henrietta—Massachusetts.
2237. Belle Lucrative—District of Columbia.
2238. Belle Superfin—District of Columbia.
2239. Bell—Massachusetts.
2240. Belmont—Massachusetts (3).
2241. Bergamot Boussiere—Massachusetts (2).
2242. Bergamot Bruxelles—Massachusetts.
2243. Bergamot Nonpareil—Massachusetts.
2244. Bernardiston—Massachusetts.
2245. Bezi de la Motte—New York.
2246. Bezi des Veterans—Massachusetts.
2247. Bezi Tardif—Massachusetts.
2248. Bezi Vaet—Massachusetts (2).
2249. Black Worcester—Massachusetts (2).
2250. Bleekers Meadow—New York (2).
2251. Bloodgood—New York (2), District of Columbia.
2252. Bonne de Zees—New York.
2253. Bon Chretien—New York (3), Massachusetts.
2254. Bouquia—Massachusetts.

2255. Broom Park—New Jersey.
2256. Brown Beurre—Massachusetts (2), New York.
2257. Brougham—New York.
2258. Buffum—New York, Massachusetts, New Hampshire.
2259. Butter—District of Columbia.
2260. Cabot—New York.
2261. Caennais—Massachusetts.
2262. Calabasse d'Eté—New York.
2263. Calabasse de Herkheimer—Massachusetts.
2264. Calhoun—New York.
2265. Capsheaf—Massachusetts.
2266. Capiaumont—New York.
2267. Canandaigua—New York.
5268. Canning—Massachusetts.
2269. Catillac—Massachusetts (2), Kansas.
2270. Charles d'Autrishe—New York.
2271. Chancellor—Massachusetts.
2272. Chapman—Pennsylvania.
2273. Chaptal—Massachusetts.
2274. Chaumontelle—Massachusetts, New York.
2275. Chinese Sand Pear—New York.
2276. Clay—New York.
2277. Colmar—New York.
2278. Colmar d'Aremberg—New York.
2279. Colmar d'Eté—Pennsylvania.
2280. Colmar Niel—Massachusetts.
2281. Columbian Virgalouse—New York.
2282. Comprette—Massachusetts.
2283. Comptesse de Launey—Massachusetts.
2284. Copea—Pennsylvania.
2285. Coter—Massachusetts.
2286. Cranston's Seedling—Massachusetts.
2287. Cross—Massachusetts—New York.
2288. Croft Castle—New Jersey.
2289. Cushing—Massachusetts.
2290. Cumberland—New York.
2291. Dallas—Massachusetts.
2292. Dana—District of Columbia.
2293. Dearborn's Seedling—New York.
2294. Delices d'Hardenpont—Massachusetts (4).
2295. Delices de Jodoigne—New York.
2296. Delices Van Mons—Massachusetts, Pennsylvania.
2297. Des Nonnes—District of Columbia (2), New York.
2298. De Sorlies—District of Columbia.
2299. De Tongre—New York.
2300. Dix—Massachusetts (3), District of Columbia.

2301. Dinsmore—Oregon.
2302. Dr. Nelis—New York.
2303. Downton—Massachusetts.
2304. Doyenne Boussock—Massachusetts, District of Columbia.
2305. Doyenne d'Alençon—Massachusetts.
2306. Doyenne d'Eté—New York.
2307. Doyenne de Comice—District of Columbia.
2308. Doyenne Defais—Massachusetts (2).
2309. Doyenne Gris—Pennsylvania.
2310. Doyenne d'Hiver—Massachusetts.
2311. Doyenne Goubault—Massachusetts.
2312. Doyenne Robin—District of Columbia, Massachusetts.
2313. Doyenne Sautellet—Massachusetts.
2314. Dunmore—Massachusetts.
2315. Dundas—Massachusetts.
2316. Duchesse d'Angouleme—Massachusetts (2), New York, New Hampshire.
2317. Duchesse de Berri d'Eté—District of Columbia.
2318. Duchesse de Mouchy—New York.
2319. Duchess of Mars—Massachusetts.
2320. Duchess Orleans—New York.
2321. Early Harvest—New York.
2322. Easter Beurre—Massachusetts (6), New York.
2323. Easter Bergamot—Massachusetts, New York.
2324. Echasserie—New York (2), Massachusetts.
2325. Emerald—Massachusetts.
2326. Endicott, from tree two hundred and forty-five years old—Massachusetts.
2327. English Jargonelle—New York.
2328. Episcopal—Massachusetts.
2329. Excellentissima—New York.
2330. Eyewood—Massachusetts (2)..
2331. Feaster—Pennsylvania.
2332. Figue—Massachusetts (2), Pennsylvania.
2333. Flemish Beauty—Massachusetts (3), New York (3), District of Columbia.
2334. Flemish Bon Chretien—Massachusetts.
2335. Fleur Double—Pennsylvania.
2336. Fondante d'Automne—New York.
2337. Fondante des Bois—New York.
2338. Fondante de Malines—New York.
2339. Fondante de Millot—New York.
2340. Fondante Van Mous—New York.
2341. Fortunee—Massachusetts.
2342. Franc Real d'Hiver—New York.
2343. Franc Real d'Eté—New York.

2344. French Bergamot—Massachusetts.
2345. French Jargonelle—New York (2).
2346. Frederick of Wurtemberg—Massachusetts, New York.
2347. Fredericka Bremer—New York.
2248. Fulton—Massachusetts.
2349. Gansel's Bergamot—New York (3).
2350. Garnons—Massachusetts.
2351. German Muscat—Massachusetts.
2352. German Chaumontelle—Massachusetts.
2353. Gendesheim—New York.
2354. Girardin—Massachusetts, New York.
2355. Gil of Gil—Pennsylvania.
2356. Golden Beurre of Bilboa—New York, Massachusetts.
2357. Glout Morceau—New York, Massachusetts.
2358. Gratiola—Massachusetts.
2359. Green—District of Columbia.
2360. Green Holland—New York.
2361. Green Sugar—New Jersey.
2362. Grand Soleil—Massachusetts.
2363. Graslin—District of Columbia.
2364. Gros Sucre—Massachusetts.
2365. Great Citron of Bohemia—New York.
2366. Guernsey Chaumontelle—Massachusetts.
2367. Hacon's Incomparable.
2368. Haddington—Pennsylvania.
2369. Harvard—New York.
2370. Haut Clochy—Massachusetts.
2371. Heathcote—New York, Massachusetts.
2372. Henkle—Massachusetts.
2373. Henry Fourth—New York.
2374. Henri Van Mons—New York.
2375. Hills Fall Butter—Massachusetts.
2376. Hosenshentz—District of Columbia.
2377. Howell—District of Columbia, New York.
2378. Hull—Massachusetts, Pennsylvania.
2379. Inconnu Cramoisee—Massachusetts (2).
2380. Jalousie—Massachusetts.
2381. Jalousie de Fontenay—Massachusetts.
2382. Jalvia—New York.
2383. Jaminette—Pennsylvania.
2384. Jean de Witt—Massachusetts, New York.
2385. Jones Seedling—New York.
2386. John Edwards—Pennsylvania.
2387. Josephine de Malines—Massachusetts.
2388. Julienne—New York.
2389. Kingsessing—District of Columbia, Pennsylvania.

2390. Knights Monarch—Massachusetts, New York, New Jersey.
2391. Lawrence—District of Columbia, Massachusetts.
2392. Las Canas—New York.
2393. Lewis—New York (2).
2394. Le Cure—Massachusetts.
2395. Leon le Clerc—New York.
2396. Little Muscat—New York.
2397. Liberté—New York.
2398. Locke—Massachusetts.
3399. Lodge—Pennsylvania.
2400. Long Striped Green—Massachusetts.
2401. Louis—Massachusetts.
2402. Louis de Prusse—Massachusetts.
2403. Louis Vilmorin—New York.
2404. Louis Phillippe—Massachusetts.
2405. Louise Bonne de Jersey—Massachusetts (3), New York.
2406. Marie—Massachusetts (3).
2407. Marie Louise—New York, Massachusetts, District of Columbia.
2408. Madame Appert—New York.
2409. Manning's Elizabeth—New York.
2410. Martin Sec—Massachusetts.
2411. McVean—District of Columbia.
2412. McLaughlin—Maine, Massachusetts.
2413. Messire Jean—New York.
2414. Medaille Napoleon—Pennsylvania.
2415. Merriam—Massachusetts.
2416. Mount Vernon—New York.
2417. Mouth Water—Massachusetts.
2418. Mouille Bouche—Massachusetts.
2419. Mollet's Guernsey—New York.
2420. Monsieur le Clerc—Pennsylvania.
2421. Napoleon—Massachusetts, Pennsylvania, New York.
2422. Napoleon d'Hiver—Massachusetts (2).
2423. Nouveau Poteau—New York.
2424. Nouveau Simon Bouvrier—New York.
2425. Newtown Virgalien—Massachusetts.
2426. Ohio Weaver—New York.
2427. Onondaga—District of Columbia, New York.
2428. Oliver's Russet—New York.
2429. Oswego Incomparable—District of Columbia.
2430. Oswego Beurre—Massachusetts.
2431. Osborn's Summer—New York.
2432. Ott—District of Columbia.
2433. Paradise d'Automne—Massachusetts, New York.
2434. Parker's American Butter—Pennsylvania.
2435. Passans du Portugal—New York.
2436. Passe Colmar—Massachusetts, New York.

2437. Paquency—Massachusetts.
2438. Paternoster—Massachusetts.
2439. Pear grown on apple tree—Virginia.
2440. Petre—New York.
2441. Pennsylvania—Pennsylvania.
2442. Philip of France—Massachusetts.
2443. Picquery—New York.
2444. Pittsboro'—North Carolina.
2445. Pitts Prolific—Massachusetts.
2446. Pound—Massachusetts, Minnesota, New York.
2447. Pocahontas—Massachusetts.
2448. Poire d'Avril—New York.
2449. Poire d'Albret—Massachusetts.
2450. Poire de Bavay—Massachusetts.
2451. Poire d'Ambre—Massachusetts.
2452. Poire des Chasseurs—Massachusetts.
2453. Poire Cire—Massachusetts.
2454. Poire de Florence—Massachusetts.
2455. Poire de Ronde—Massachusetts.
2456. Poire Nock—Massachusetts.
2457. Poire Rameux—Massachusetts.
2458. Pope's Scarlet Major—New York.
2459. Prince Saint Germain—District of Columbia.
2460. Queen of the Low Countries—New York.
2461. Quilletete—Massachusetts.
2462. Rapalje Seedling—New York.
2463. Rene des Poires—New York.
2464. Rigolou—Massachusetts.
2465. Rondelet—New York.
2466. Rostiezer—New York.
2467. Rousselet de Rheims—New York.
2468. Rousselet Hatif—New York.
2469. Rousselet de Meester—New York.
2470. Russet—New York.
2471. Rutter—New York.
2472. Sabine Van Mons—Massachusetts.
2473. Sans Peau—New York.
2474. Sentin—Massachusetts.
2475. Seigneur d'Esperin—New York.
2476. Serrurier—Massachusetts.
2477. Seckel Seedling—District of Columbia.
2478. Seckel—California, New York.
2479. Sheldon—New Hampshire, Massachusetts, New York.
2480. Sieulle—New York, Massachusetts.
2481. Soldat Laboreur—Massachusetts, New York.
2482. Spring Beurre—Massachusetts.
2483. St. Ghislain—New York.

2484. St. Michael Archangel—Pennsylvania, District Columbia.
2485. St. Marc—Massachusetts.
2486. St. Nicholas—New York.
2487. St. Therese—New York.
2488. St. Germain—New York.
2489. Striped—New York, Massachusetts.
2490. Striped Dean—New York.
2491. Striped Madeleine—New York.
2492. Styrian—Massachusetts.
2493. Stevens Genesee—New York.
2494. Sterling—New York.
2495. Surpasse Meurs—Massachusetts.
2496. Surpasse Virgalieu—New York, Massachusetts.
2497. Susette de Bavay—Massachusetts.
2498. Swan's Egg—Massachusetts, New Jersey.
2499. Triomphe Jodoigne—New Nork.
2500. Tresor d'Amour—Pennsylvania.
2501. Trout—New York, Massachusetts.
2502. Truckhill Bergamot—Massachusetts.
2503. Therese Appert—New York.
2504. Tyson—New York, Massachusetts.
2505. Urbaniste—Massachusetts (4), New York (2.)
2506. Uvedale St. German—New Hampshire.
2507. Van Mons Leon le Clerc—Massachusetts, New York.
2508. Van Mons Talc—Massachusetts.
2509. Van Mons Late—Massachusetts.
2510. Van Buren—New York.
2511. Vallee Franc—New York.
2512. Vert Longue—New York.
2513. Vert Longue Panache—Pennsylvania.
2514. Vezouzier—Massachusetts.
2515. Vicar of Winkfield—Massachusetts.
2516. Virgoulouse—New York, Pennsylvania, Massachusetts.
2517. Washington—New York, Pennsylvania, District of Columbia.
2518. Waterloo—New York.
2519. Walker's Favorite—New York.
2520. Wetherill—Pennsylvania.
2521. Whitfield—Massachusetts.
2522. White Doyenne—Massachusetts, District of Columbia.
2523. Williams Seedling—New York.
2524. Wilhelmina—Massachusetts.
2525. Wilbur—Massachusetts.
2526. Wilkinson—New York.
2527. Winter Nelis—Oregon, New York; Massachusetts.
2528. Winter Sabine—New Jersey.
2529. Winter Thorn—Massachusetts.
2530. Winter Virgouleuse—New York, Massachusetts.

PLUMS.

The original specimens were grown near Fishkill and Newburg, N. Y

2531. Angola.
2532. Autumn Damson.
2533. Autumn Gage.
2534. Bingham.
2535. Blue Imperatrice.
2536. Blue Imperial.
2537. Blue Gage.
2538. Brinckershoff's Seedling.
2539. Brown Gage.
2540. Bleeker's Gage.
2541. Bogardus Gage.
2542. Bolmar's Washington (3).
2543. Buel's Favorite.
2544. Burlington.
2545. Caledonian.
2546. Carey's Seedling.
2547. Carnival Frost.
2548. Cherry.
2549. Citron Gage.
2550. Columbia.
2551. Coe's Late Red.
2552. Coe's Golden Drop (2).
2553. Cruger's Scarlet.
2554. Crosby.
2555. Denniston Albany Beauty.
2556. Denniston Red (3).
2557. Denniston Superb (2).
2558. Downton Imperatrice (2).
2559. Duonyer's Victoria (4).
2560. Dorr's Favorite.
2561. Dorr's Seedling.
2562. Early Orleans.
2563. Early Damson.
2564. Egg (3).
2565. Emerald Drop.
2566. English Gage.
2567. Fotheringham.
2568. Frost Plum.
2569. French Prune.
2570. German Gage.
2571. Golden Cherry.
2572. Green Gage.
2573. Horseplum.
2574. Huling's Superb.
2575. Ickworth.
2576. Ive's Frost.
2577. Jaune Hatif.
2578. Jefferson.
2579. Knight's Large Green.
2580. Knevel's Late.
2581. Lawrence Favorite (2).
2582. La Delicieuse.
2583. Long Scarlet Gage.
2584. Lombard.
2585. Lucomb's Nonsuch.
2586. MacLauchlin.
2587. Mirabelle.
2588. Monstrous Perdigon.
2589. Morocco.
2590. New Green Gage.
2591. Penobscot.
2592. Pear Neck, or Mamekonne.
2593. Pond's Seedling (2).
2594. Purple Favorite (3).
2595. Prince's Gage.
2596. Prune (4).
2597. Prune d'Agen.
2598. Prune datte.(?)
2599. Quetsche.
2600. Red Gage.
2601. Real German Prune.
2602. St. Martin's Quetsche.
2603. St. Catherine.
2604. Seedling (2).
2605. Siamese.
2606. Schuyler.
2607. Sharp's Emperor.
2608. Small Yellow Gage.
2609. Smith's Orleans.
2610. Virgin.
2611. Wasp.
2612. Wild Chickasaw.
2613. Wild Plum.
2614. Winter Damson (2).
2615. Wine Sour.
2616. Yellow Gage (2).

CHERRIES.

(Grown near Newburg and Fishkill, N. Y.)

2617. Byrnesville.
2618. Boyer's Early Heart.
2619. Black Oxheart.
2620. Black Tartarian.
2621. Black Sweet.
2622. Black Dutch.
2623. Black Mazzard.
2624. Belle de Choisy.
2625. Carnation.
2626. Champaigne.
2627. Cleveland.
2628. Coe's Transparent.
2629. Davenport.
2630. Downton.
2631. Dutch Morello.
2632. Early Richmond.
2633. Early White Heart.
2634. English Heart.
2635. English Oxheart.
2636. Honey.
2637. Holland Bigarreau.
2638. Knight's Early Black
2639. Kirtland's Mary.
2640. Late Duke.
2641. Madison Bigarreau.
2642. Mayduke.
2643. Manning's Mottled.
2644. Napoleon (2).
2645. Plumstone Morello.
2646. Roberts' Red Heart.
2647. Red Oxheart.
2648. Rumsey's White Heart.
2649. Rumsey's Ever-bearing.
2650. Sweet Montmorenci.
2651. Seedling.
2652. Short-stalk Montmorenci.
2653. Transparent Guigne.
2654. Tradescant's Black Heart.
2655. Verplanck's White.
2656. Wild.
2657. Weeping Morello (2).
2658. White Heart.
2659. Yellow Spanish.

APRICOTS.

2660. Apricot Peche.
2661. Breda.
2662. Dubois Golden (2).
2663. Shipley.

NECTARINES.

2664. Boston.
2665. Early Violet (2).
2666. Elruge.
2667. Golden.
2668. Hunt's Tawney.
2669. Hardwicke's Seedling
2670. New White.
2671. Pitmaston Orange.
2672. Red Roman.

MELONS.

2673. Gypsey Watermelon.
2674. Black Spanish Watermelon.
5675. Ice Rind Watermelon.
2676. Orange Watermelon.
2677. Malaga Watermelon (imported).
2678. Mango Watermelon.
2679. Hunter Muskmelon.
2680. Nutmeg Muskmelon.
2681. Preserving Citron.
2682. Japan Apple-pie Melon.
2683. Queen Anne's Pocket Melon.

SQUASHES.

2684. Boston Marrow.
2685. Winter Crookneck.
2686. Hubbard.
2687. Mammoth.
2688. Turk's Head, or Turban (2).
2689. Summer.
2690. Snake (*Trichosanthes colubrina.*)

POTATOES.

(Original specimens, chiefly contributed by Bliss & Co., of New York.

2691. Andes.
2692. Bermuda.
2693. Balkley Seedling.
2694. Breese's Peerless.
2695. Breese's Prolific.
2696. Black Kidney.
2697. California.
2698. Calico (2).
2699. Colebrook.
2700. Climax.
2701. Compton's Surprise.
2702. Dover Seedling.
2703. Dog Foot.
2704. Dyckman.
2705. Dyright.
2706. Early Shaw.
2707. Early Mohawk.
2708. Early Rose.
2709. Early Purple.
2710. Early Minnesota.
2711. Early Samaritan.
2712. Early Victor.
2713. Early Goodrich.
2714. Extra Early Vermont.
2715. Extra Early White.
2716. Excelsior.
2717. Fluke.
2718. Garnet Chili.
2719. Great Western.
2720. Granite State.
2721. Harrison.
2722. Jackson White.
2723. Jones' Seedling.
2724. King of the Earlies.
2725. Kearsarge.
2726. Lady Finger.
2727. Mercer.
2728. Mexican (2).
2729. Monitor.
2730. Nova Scotia.
2731. No Blow.
2732. Patterson's Blue.
2733. Prince Albert.
2734. Peerless.
2735. Patterson's Albert.
2736. Pinkeye Rustycoat.
2737. Peach Blow.
2738. Raspberry Leaved.
2739. Red Streak.
2740. Scotch White.
3741. Seedling Rock.
2742. Strawberry.
2743. Titicaca.
2744. Vandervere.
2745. White Peach Blow.

MISCELLANEOUS.

2746. Long Blood Beet (4).
2747. Turnip Early Beet.
2748. Sugar Beet.
2749. Mangold Wurzel.
2750. Long Orange Carrot.
2751. Early Horn Carrot.
2752. White Belgian Carrot.
2753. Kohl-Rabi.
2754. Strap Leaf Turnip.
2755. Sweedish Turnip.
2756. Yellow Globe Turnip.
2757. Orange Turnip.

2758. Long Scarlet Radish.
2759. Early Turnip Radish.
2760. Olive Radish.
2761. Red Winter Radish.
2762. Black Spanish (winter) Radish.
2763. White Neapolitan Onion (imported.)
2764. Giant White Tripoli Onion.
2765. Italian Red Onion.
2766. Long Onion.
2767. Silver Skin Onion.
2768. Red Danvers Onion.
2769. Yellow Danvers Onion.
2770. Yam (Florida).
2771. Sweet Potato (4).
2772. Long Parsnip.
2773. Soolyn or Toon-qua Cucumber (Washington).
London Long Green Cucumber.
2775. Long Green Cucumber.
2776. Gherkin.
2777. Gourds, varieties (12).
2778. Hercules Club.
2779. Purple Egg Plant.
2780. Trophy Tomato.
2781. Cherry Tomato.
2782. Persimmon.
2783. Marrow Pea.
2784. Horticultural Bean.
2785. Rhubarb.
2786. Asparagus.
2787. Peppers, large red.
2788. Alligator Pear (Florida).
2789. Fruit of Sand Box Tree.
2790. Banana.
2791. Sugar-loaf Pine-apple.
2792. Fruit Prickly Pear.
2793. Ogeechee Lime.
2794. Nyssa.
2795. Apple Quince.
2796. Pear Quince.
2797. Japan Quince (large yellow).
Japan Quince (flowering.)
2798. Fruit of Monstera Deliciosa.
2799. Fruit of Cereus (Indian Food).
2800. Fruit of Opuntia Vulgaris (Prickly Pear).
2801. Fruit of Opuntia Ficus Indica (Europe).
2802. Fruit of Maclura Aurantiaca (Osage orange).
2803. Orange—Florida, California (4).
2804. Lemon—Florida, California.
2805. Shaddock—Florida.
2806. Lime—Florida.
2807. Pawpaw.

COLLECTION OF ECONOMIC ENTOMOLOGY.

This collection, filling 24 cases or drawers, and numbering over 1,000 specimens, comprises the most common forms of the injurious and beneficial insects of the United States. The collection is by no means complete, but will serve to illustrate the plan of arrangement, which is especially adapted to cabinets of agricultural colleges and similar institutions.

The plan of arrangement is to show in one group the insect foes of a certain food plant in the four stages of egg, larva, pupa, and insect, accompanied by specimens exhibiting the mode of injury and classified according to the portion of the plant injured, as root, stalk, foliage, or fruit, to be followed by the beneficial insects known to destroy a particular species; in short, the idea of such a collection is to be able to show at a glance the entire history of any insect or group of insects affecting any of our food crops.

The first stages of many insects could not be shown in the present collection, and in some cases the insects themselves were wanting, and so were supplied by water-color drawings executed by Mr. F. G. Sanborn, to whom the work of arrangement was given, or drawings from Mr. Glover's plates.

CASE A.

Nos. 2808–2846.—Insects injurious to mankind by destroying Indian corn or maize; 63 specimens, 39 species. The principal injurious species are *Anthomyia zeæ*, in the seed corn after planting; *Gortyna nitela*, in the stalk; *Sphenophorus* (spp.), on the roots; *Micropus leucopterus*, *Caloptenus* (spp.), *Hyperchiria varia*, *Arctia* (spp.), &c., on the foliage; *Heliothis armigera*, in the green corn; *Silvanus surinamensis*, &c., in stored grain, and *Tenebrio mollitor* and *Asopia costalis* in the meal or ground maize.

CASE B.

Nos. 2847–2868.—Insects injurious to mankind by destroying wheat, rye, oats, and other cereal crops; 40 specimens, 22 species. The principal injurious species are *Cecidomyia tritici* and *destructor*, the wheat midge and Hessian fly, *Leucania unipuncta*, the army worm, *Micropus leucopterus*, the chinch bug, *Arctia* (spp.), *Pyralis farinalis*, &c.

Nos. .—Insects on grasses and forage plants; 7 species, 13 specimens shown. *Colias philodice*, the common yellow butterfly, and *Phyllophaga fusca*, the May beetle, are prominent species, the principal damage being done in the larval stages, the last named feeding upon grass roots.

CASE C.

Nos. 2869–2901.—Insects injurious to mankind by destroying cotton; 33 species, 54 specimens. The most common enemies to the cotton plant are the cotton army worm, *Anomis xylina*, and the boll worm, *Heliothis armigera*. A species of *Aphis* is quite injurious to the tender shoots, and *Dysdercus suturellus* stains the mature cotton.

CASE D.

Nos. 2902–2917.—Insects injurious to mankind by destroying the potato; 16 species, 23 specimens. The most prominent injurious species is the western, or Colorado beetle, *Doryphora decemlineata*. *Epicauta* (spp.), *Lema trilineata*, and *Macrobasis fabricii* are also quite injurious at times.

No. 2918.—Insects injurious to the tomato, as the large green tomato-worm, *Macrosila quinquemaculata*.

Nos. 2919–2922.—Insects injurious to tobacco; 4 species, 4 specimens, *Macrosila carolina* destroys the growing plant. *Sitodrepa panicea* destroys manufactured tobacco.

CASE E.

Nos. 2923–2929.—Insects injurious to cucurbitaceous plants, as cucumber, squash, melons, &c; 7 species, 12 specimens. Principal enemies, *Diabrotica vittata*, "cucumber bugs," *Epilachna borealis* and *Coreus tristis* on squash. *Phakellura hyalinitalis* injure cucumbers in Florida.

Nos. 2930–2954.—Insects destroying milkweed, dogsbane, &c.; 25 species, 35 specimens. *Danais plexippus*, in all its stages, is an example of this group of insects.

CASE F.

Nos. 2955–2982.—Insects injurious to mankind by destroying the plants of the kitchen garden, as cabbage, turnip, &c.; 28 species, 53 specimens. *Pieris rapae*, and *oleracea*, *Plusia brassicae* (in the South) and *Strachia histrionica* are prominent enemies of the cabbage grower.

CASE G.

Nos. 2983–3013.—Insects injurious to mankind by destroying the grape; 31 species, 47 specimens. The grape-vine is principally injured on the roots by *Phylloxera vastatrix*. *Cicada pruinosa* and *septendecem*, *Œcanthus niveus* and *Bostrichus bicaudatus* injure the canes. *Pemphigus vitifoliae*, *Tettigonia* (spp.), *Procris americana*, &c., destroy the foliage.

CASE H.

Nos. 3014–3039.—Insects injurious to fruit, fruit trees and shrubs: 26 species, 49 specimens. Among the varieties injured are the pear, peach, plum, cherry, current, raspberry, &c., and among the prominent insects may be mentioned *Aegeria exitiosa*, the peach borer, *Trochilium tipuliformis*, *Scolytus pyri*, *Conotrachelus nenuphar*, the "curculio," *Selandria cerasi*, &c.

CASE I.

Nos. 3040–3068.—Insects injurious to mankind by destroying the apple; 29 species, 52 specimens. Most prominent species, *Saperda bivittata*, the apple tree-borer; *Chrysobothris femorata*, *Amphicerus bicaudatus*, *Carpocapsa pomonella*, the apple worm; *Clisiocampa americana*, the tent caterpillar; *Anisopteryx vernata*, *Aspidiotus conchiformis*, the apple-bark scale, and others.

CASE J.

Nos. 3069–3109.—Insects injurious to the household, commonly called household pests. &c.; 41 species, 58 specimens. Two species of cockroaches are shown, *Stylopyga orientalis* and *Ectobia germanica;* also the ham-beetle, *Dermestes lardarius;* the meal-worm, *Tenebrio molitor*, *Attagenus pellio*, and other insects rendering food unfit for use, together with *Musca domestica* and other species of flies; *Formica*, or ants, closing with the insidious disturber of sleep, *Cimex lectularius*.

CASE K.

Nos. 3110–3146.—Insects injurious by aiding in the destruction of forest trees in general; 37 species, 59 specimens. Many of the species shown are enemies to various kinds of trees, while others are particularly injurious to but one. *Clisiocampa sylvatica*, the forest tent caterpillar, is particularly injurious. Other prominent species deserving of mention are *Oncideres cingulatus*, the twig girdler; *Scolytus caryæ*, the hickory-bark beetle; *Anisota rubicunda and senatoria*, *Telea polyphemus*, *Platysamia cecropia*, *Actias luna*, *Citheronia regalis*, &c.

CASE L.

Nos. 3147–3185.—Insects injurious to pine trees. In this case 39 species and 55 specimens are shown. A number of the species attacking the tree in its growing state, as *Pissodes strobi*, *Hylobius pales and confusus*, *Mytilaspis pinifoliæ*, &c., while the others make it their food after it has been cut down for lumber. Among the insects attacking dead pine wood may be mentioned *Monohammus tittillator*, *Callidium violaceum* and *ligneum*, *Xylocopa carolina*, the carpenter bee; *Hylotrupes bajulus*, &c.

CASE M.

Nos. 3186–3205.—Insects injurious to mankind by destroying shade trees; 20 species, 50 specimens. The elm is principally injured by *Anisopteryx vernata*, *Galeruca calmariensis*, *Hyphantria textor*, and some of the larvæ of moths, as the *Arctians*. *Xyleutes robiniæ* and *Clytus robiniæ* are destructive to the locust. *Anisota rubicunda* and *Ennemos subsignariæ* injure maples.

CASE N.

Nos. 3206–3233.—Insects injurious to mankind by destroying or injuring the foliage or wood of various plants or trees; 28 species and 43 specimens. The orange tree is injured by *Anisomorpha buprestoides*, *Rhomalea microptera*, *Papilio thoas*, *Aspidiotus gloverii*, &c., *Caryborus arthriticus* injures the palmetto.

CASE O.

Nos. 3234–3260.—This case is devoted to 36 specimens, representing 27 species of galls or gall-making insects affecting the different varieties of the oak tree, among which are shown the oak-apple gall, *Cynips spongifica*, the wool-sower gall, *C. seminator*, *Cynips cornigera*, *C. q.-globulus*, *C. q.-inanis*, *C. q.-phellos*, &c.

CASE P.

Nos. 3261–3314.—In this case are shown the galls of other plants than oak—44 species, 48 specimens. Many of these are unnamed in the collection, which includes galls found upon the rose, blackberry, *solidago*, or golden-rod, strawberry, grape-vine, walnut, maple, huckleberry, willow, elm, wild cherry, &c.

CASE Q.

Nos. 3315–3228.—In this case are shown two collections. First, the insects injurious to fish by destroying the eggs or young; 14 species, 17 specimens. *Belostoma americana*, *Dytiscus americanus*, several species of *Notonecta* and other true "bugs" (*Hemiptera*) represent this class of insects.

Nos. 3329–3358.—The second collection is devoted to those insects injurious to bees, and those that attack man and cattle; 30 species, 40 specimens. Among the species troublesome to man may be mentioned the flea, chigae, several species of *Pediculi*, and numbers of the tormenting flies, also injurious to the lower animals.

CASE R.

Nos. 3359–3406.—A collection comprising 33 different objects of insect architecture, and the insects producing them, in all 48 specimens. Prominent among the objects shown are the nests of the rose-cutting bee, *Megachile*, the rhinoceros-beetle, *Dynastes tityus*, of wasps, and various other insects.

CASES S AND T.

Nos. 3407–3476.—In these two cases are shown 70 species of the most common forms of our beneficial insects, making themselves the friends of the farmer by destroying noxious species. Among the 90 specimens exhibited may be mentioned several species of *Tachina*, which live in the bodies of other insects, many wasps, which destroy caterpillars while provisioning their nests, species of tiger and ground beetles that make themselves useful in both larval and perfect stages, and numbers of true bugs, suctorial insects, destroying caterpillars, such as *Redurius novenarius*, and other species, destroying insects in various ways.

CASE U.

Nos. 3477–3507.—Another class of beneficial insects, which are useful as scavengers by removing filth and carrion; 31 species and 42 specimens are represented, the collection including many of the flies, the "tumble-bugs" so-called, and the sexton beetles, remarkable for their powers in burying the bodies of birds and small mammals as food for their young.

Nos. 3508–3524.—In this case is also shown 22 specimens representing 17 species of insects, principally grasshoppers, that are available as food for man. A number of these are already eaten to some extent by Indians in this country, and others are shown which probably would answer the same purpose quite as well should they ever be needed. The eggs of *Corixa femorata*, a water bug (and possibly the insects), are eaten by some of the natives of Mexico, while the Indians near Lake Mono, California, collect and eat the larvæ of a fly (veritable maggots) found on the waters of the lake, called "ke-chah-va."

CASES V AND W.

NOS. 3525–3563.—In these two cases are shown 39 specimens of the wild silk-producing insects of this country and their cocoons and silk, together with representative specimens of the *Bombyx mori*, or silk worm of commerce, with various samples of the silk made by this species. Prominent among the American species we may mention *Telea polyphemus*, *Platysamia cecropia*, *Actias luna*, *S. cynthia*, and *Callosamia promethia*.

CASE X.

NOS. 3564–3572.—Showing a few *insecticides*, so called, and traps and devices for the destruction of insects. As this collection is very incomplete it will hardly be necessary to give it more than a mention, to show its place in a complete cabinet of economic entomology.

ORNITHOLOGICAL COLLECTION.

The object of making this collection of native birds, animals, &c., in the Museum of Agriculture is merely to show their value to the farmer, as destroying noxious insects, or those injurious to the crops. Both the common and scientific name of the bird are marked on the descriptive label, with reference to the authorities, and if injurious the specimen will be distinguished by a larger or smaller black mark on the label, or if entirely beneficial the label will be left unmarked. The contents of the stomach are placed near each bird, showing what last it fed upon. The smaller hawks and owls, although considered injurious as preying upon small birds, chickens, &c., are also partly beneficial as destroying ground mice and insects. In proof of this, a sparrow-hawk shot in October among a flock of reed-birds was found to be filled with grasshoppers, and contained not the slightest vestige of feathers or bones of small birds. This bird was remarkably fat. A red-shouldered hawk, or winter falcon, shot in November, was found filled with crickets and grasshoppers, although its usual food appears to be small birds, animals, frogs, &c.

Taking the larger hawks, however, the damage they do in destroying poultry and smaller insectivorous birds is by no means counterbalanced by the good deeds in ridding us of mice, insects, &c. The large owls, too, although doing some good as destroying rats, mice, &c., are very destructive to small birds, game, and poultry. The cuckoo, or raincrow, destroys many hairy and prickly caterpillars, rejected by other birds. Woodpeckers, as a general rule, are beneficial to orchardists by destroying the larvæ of wood-boring insects, although some of the species have been accused of feeding on the sap and young wood. The whippoorwill and night-hawk are beneficial as destroying multitudes of night-flying insects. Flycatchers, as their name implies, are beneficial as destroying flies and other insects, and even the king bird, also known as the bee bird, that acquired its name from the supposition of their destroying the honey bee, feeds also on other insects, as was proved by one sent by a farmer, who shot it suspiciously close to his bee-hive, which, when examined, was found to contain fifteen small leaf-eating beetles and not a vestige of a bee.

The thrushes feed on fruits, seeds, and insects. A common robin, although a great destroyer of cherries and other small fruits, yet, at certain seasons, feeds also on worms and insects. The stomach of a bluebird, shot in March, contained grasshoppers, and when feeding their young these birds may be observed carrying caterpillars and other insects to their nests. Swallows and martins are exceedingly useful in destroying multitudes of small insects flying in the air, such as gnats, mosquitoes, &c. Pigeons, turkeys, grouse, &c., feed principally upon seeds and grain, but some of them also feed partially upon insects. Cranes, plovers, &c., destroy many reptiles, slugs, and insects. Geese and ducks, though feeding principally on grain and vegetables, no doubt serve also to destroy many insects and small reptiles. It is, however, on our small insectivorous birds that we ought principally to rely as insect exterminators, and the American farmer should protect them by all the means in his power.

Mr. Florent Prévost, who collected and examined the stomachs of European birds for several years, comes to the conclusion that from his researches "birds are in general far more useful than hurtful to the agriculturist," and thus the mischief done at certain periods by the grain-eating species is largely compensated by the destruction of insects they effect at other periods. The collection of poultry is intended to exhibit the varieties of barn-yard fowls, ducks, &c., now in domestication in the United States and to exhibit the best breeds at present existing in our poultry yards, as likewise to show new or valuable foreign breeds of poultry which may be profitably introduced or crossed with our native birds for the production of eggs or for the table.

LISTS OF BIRDS BENEFICIAL OR INJURIOUS TO THE AGRICULTURIST BY DESTROYING INSECTS, FRUITS, SEEDS, ETC., ON EXHIBITION AT THE CENTENNIAL.

(Birds injurious by destroying fruits, seeds, &c., are distinguished by a smaller or larger black mark on the perch or label.)

3573. Hawk, Sparrow-hawk, *Tinnunculus sparverius.*
3574. Hawk, Goshawk, *Astur atricapillus.*
3575. Owl, Mottled, *Scops asio.*

3576. Owl, Short-eared, *Brachyotus asio.*
3577. Parakeet, *Conurus carolinensis.*
3578. Chapparel cock, *Geococcyx californianus.*
3579. Cuckoo, Yellow-bill, *Coccygus americanus.*
3580. Cuckoo, Black-bill, *Coccygus erypthropthalmus.*
3581. Woodpecker, Hairy, *Picus villosus.*
3582. Woodpecker, Downy, *Picus pubescens.*
3583. Woodpecker, Three-toed, *Picoides arcticus.*
3584. Woodpecker, Yellow-bellied, *Sphyropicus varius.*
3586–3587. Woodpecker, Red-bellied, *Centurus carolinus.*
3588–3590. Woodpecker, Red-headed, *Melanerpes erythrocephalus.*
3591. Woodpecker, Lewis, *Melanerpes torquatus.*
3592–3593. Black-woodcock, *Hylotomus pileatus.*
3594–3597. Flicker, High-hole or Yellow-shafted woodpecker, *Colaptus auralus.*
3598–3599. Flicker, Red-shafted, *Colaptes mexicanus.*
3600–3603. Humming bird, Ruby-throated, *Trochilus colubris.*
3604–3606. Chimney swallow, *Chætura pelasgia.*
3607–3608. Whipporwill, *Antrostomus vociferus.*
3609–3610. Night Hawk, *Chordeiles popetue.*
3611–3612. Kingfisher, Belted, *Ceryle (Megaceryle) alcyon.*
3613–3614. Kingbird, *Tyrannus carolinensis.*
3615–3616. Flycatcher, Great-crested, *Myiarchus crinitus.*
3617–3618. Peewee, *Sayornus fuscus.*
3619. Peewee, Wood, *Contopus borealis.*
3620. Peewee, Least, (or flycatcher) *Empidonax minimus.*
3621. Flycatcher, Small green-crested, *Empidonax acadicus.*
3622. Flycatcher, Yellow-bellied, *Empidonax flaviventris .*
3623–3624. Thrush, Wood, *Turdus mustelinus.*
3625. Thrush, Hermit, *Turdus pallasi.*
3626. Thrush, Gray-cheeked, *Turdus aliciæ.*
3627–3630. Robin, *Turdus migratorus* and *albinus.*
3631. Robin, Varied, *Turdus parius.*
3632. Bluebird, *Sialia sialis.*
3633. Bluebird, Western, *Sialia mexicana.*
3634. Bluebird, Rocky Mountain, *Sialia arctica.*
3635–3636. Wren, Gold-crested, *Regalus satrapa.*
3637. Wren, Ruby-crested, *Regula calendula.*
3638. Titlark, *Anthus ludovicianus.*
3639–3640. Creeper, Black and white, *Mniotilta varia.*
3641. Warbler, Blue yellow-back, *Parula americana.*
3642. Warbler, Maryland or Yellow-throat, *Geothlypis trichas.*
3643. Warbler, Kentucky, *Oporornis formosus.*
3644. Chat, Yellow-breasted, *Icteria viridis.*
3645. Warbler, Worm-eating, *Helmitherus vermivorus.*
3646. Warbler, Blue-winged yellow, *Helminthopaga pinus.*

3647. Warbler, Gold-winged, ***Helminthopaga chrysoptera.***
3648. Warbler, or Crowned, ***Helminthopaga celata.***
3649. Thrush, Water, ***Seiurus noveboracensis.***
3650. Thrush, Gold crowned, ***Seiurus aurocapillus.***
3651. Thrush, Water, large-bellied, ***Seiurus ludovicianus.***
3652. Warbler, Black-throated green, ***Dendroica virens.***
3653. Warbler, Black-throated blue, ***Dendroica canadensis.***
3654. Warbler, Yellow-rump, ***Dendroica coronata.***
3655. Warbler, Audubon's, ***Dendroica audubonii.***
3656. Warbler, Blackburn, ***Dendroica blackburnii.***
3657. Warbler, Bay-breasted, ***Dendroica castanea.***
3658. Warbler, Pine-creeping, ***Dendroica pini.***
3659. Warbler, Chestnut-sided, ***Dendroica pennsylvanica.***
3660. Warbler, Blue, ***Dendroica cærulea.***
3660. Warbler, Black-poll, ***Dendroica striata.***
3661. Warbler, Black and Yellow, ***Dendroica maculosa.***
3662. Warbler, Cape May, ***Dendroica tigrina.***
3663. Warbler, Yellow-poll, ***Dendroica palmarum.***
3664. Warbler, Yellow-throated, ***Dendroica superciliosa.***
3665. Warbler, Prairie, ***Dendroica discolor.***
3666. Flycatcher, Green black cap, ***Myiodioctes pusillus.***
3667. Flycatcher, Canada, ***Myiodioctes canadensis.***
3668. Redstart, ***Setophaga ruticilla.***
3669–3670. Tanager, Scarlet, ***Pyranga rubra.***
3671–3672. Tanager, or Summer red-bird, ***Pyranga æstiva.***
3673. Tanager, Louisiana, ***Pyranga ludoviciana.***
3674. Swallow, Barn, ***Hirundo horreorum.***
3675. Swallow, Cliff, ***Hirundo lunifrons.***
3676. Swallow, Bank, ***Cotyle riparia.***
3677. Swallow, Martin purple, ***Progne purpurea.***
3678. Waxwing, ***Ampelis garrulus.***
3679. Cedar bird, ***Ampelis cedrorum.***
3680. Shrike, Great Northern, or butcher bird, ***Collureo borealis.***
3681. Butcher bird or shrike, white rumped, ***Collurco excubitoroides.***
3682. Flycatcher, Warbling, ***Vireo gilvus.***
3683. Flycatcher, Red-eyed, ***Vireo olivaceus.***
3684. Flycatcher, White-eyed, ***Vireo noveboracensis.***
3685. Flycatcher, Blue-headed, ***Vireo solitarius.***
3686. Mocking bird, ***Mimus pollyglottus.***
3687. Catbird, ***Mimus Carolinensis.***
3688–3689. Thrush, Brown, ***Harporhynchus rufus.***
3690–3691. Wren, Great Carolina, ***Triothorus ludovicianus.***
3692–3693. Wren, Long-bellied marsh, ***Cistothorus palustris.***
3694. Wren, Short-bellied, ***Cistothorus stellaris.***
3695–3696. Wren, House, ***Troglodytes aedon.***
3697–3698. Wren, Winter, ***Anorthura hyemalis.***

3699. Creeper, *Certhia americana.*

3700–3701. Nuthatch, White-bellied, *Sitta carolinensis.*

3702–3703. Nuthatch, Red-bellied, *Sitta canadensis.*

3704. Flycatcher, Blue gray, *Polioptila cerulea.*

3705. Titmouse, Tufted, *Lophophanes bicolor.*

3706. Titmouse, Black-cap, *Parus atricapillus.*

3707–3708. Skylark, *Eremophila cornuta.*

3709–3710. Grosbeak, *Pinicola canadensis.*

3711–3712. Finch, Purple, *Carpodacus purpureus.*

3713. Finch, House, *Carpodacus frontalis.*

3714–3716. Yellow bird, *Chrysomitris tristis.*

3717–3718. Finch, Pine or Silken, *Chrysomitris pinus.*

3719–3721. Cross bill, Red, *Curvirostra americana.*

3722–3723. Cross bill, White wing, *Curvirostra leucoptera.*

3724–3725. Red poll, Lesser, *Ægiothus linarius.*

3726. Snow bunting, *Plectrophanes nivalis.*

3727–3728. Lapland, Long-spur, *Centrophanes lapponicus.*

3729. Sparrow, Savanna, *Passerculus savanna.*

3730. Finch, Grass, *Pooecetes gramineus.*

3731. Sparrow, Yellow-winged, *Coturniculus passerinus.*

3732. Finch, Sea-side, *Amodromus maritimus.*

3733. Finch, Lark, *Chondestes grammaca.*

3734. Sparrow, White-crown, *Zonotrichia leucophrys.*

3735. Sparrow, Gambles, *Zonotrichia gambeli.*

3736. Sparrow, White-throat, *Zonotrichia albicollis.*

3737–3739. Snow bird, *Junco hyemalis.*

3740–3741. Sparrow, Tree, *Spizella monticola.*

3742. Sparrow, Field, *Spizella pusilla.*

3743–3744. Sparrow, Chipping, *Spizella socialis.*

3745–3746. Sparrow, Song, *Melospiza melodia.*

3747–3748. Sparrow, Lincoln's, *Melospiza lincolnii.*

3749–3750. Sparrow, Swamp, *Melospiza palustris.*

3751–3752. Sparrow, Fox-colored, *Passerella iliaca.*

3753. Bunting, Black-throat, *Euspiza americana.*

3754. Grosbeak, Blue, *Guiraca cærulea.*

3755. Grosbeak, Rose-breasted, *Guiraca ludoviciana.*

3756. Bunting, Painted, *Cyanospiza ciris.*

3757. Indigo bird, *Cyanospizac yanea.*

3758. Redbird, *Cardinalis virginianus.*

3759. Ground robin (Towhee), *Pipilo erythropthalmus.*

3760. Finch, Greentailed, *Pipilo chlorurus.*

3761–3763. Bobolink, Reed or Rice bird, *Dolichonyx oryzivorus.*

3764. Cowbird, *Molothrus pecoris.*

3765–3767. Black bird, Swamp or Red-winged, *Agelaius phœniceus.*

3768–3769. Black bird, Yellow-head, *Xanthocephalus icterocephalus.*

3770–3772. Lark, Meadow, *Sturnella magna.*

3773. Lark, Western, *Sturnella neglecta.*
3771–3772. Oriole, Orchard, *Icterus spurius.*
3773. Oriole, Baltimore, *Icterus baltimore.*
3774. Oriole, Bullock's, *Icterus bullockii.*
3775–3776. Blackbird, Rusty, *Scolecophagus ferrugineus.*
3777. Blackbird, Brewer's. *Scolecophagus cyanocephalus.*
3778–3779. Grakle, Boat-tail, *Guncalis major.*
3780. Blackbird, Crow, *Quiscalus versicolor.*
3781–3782. Crow, common American, *Corvus americanus.*
3783. Crow, common American, *Corvus americanus* (part white).
3784. Crow, Fish crow, *Corvus ossifragus.*
3785. Magpie, *Pica hudsonica.*
3786–3787. Jay, Blue-crested, *Cyanura cristata.*
3788. Jay, Stellar's, *Cyanura stelleri.*
3789–3790. Jay, Canada (or Whiskey Jack), *Perisoreus canadensis.*

GEESE.

3791–3792. Geese, Bremen.
3793–3794. Geese, Chinese, white.
3795–3796. Geese, Canadian or wild-domesticated.
3797. Geese, Brant, wild.

DUCKS.

3798–3799. Wild Duck, Red Head.
3800–3801. Wild Duck, Canvass-back.
3802–3805. Wild Duck, Black or Dusky. Origin of one variety of domestic duck.
3806–3807. Wild Duck, Mallard. Origin of one variety of domestic duck.
3808–3809. Wild Duck, Summer or Wood—semi-domesticated.
3810–3811. Wild Duck. Mandarine, from China.
3812–3813. Wild Duck, Muscovy, from South America.
3814–3815. Wild Duck, Muscovy, domestic.
3816–3818. Duck Mallard, domesticated and improved (Rouen).
3819–3848. Duck, crosses between domestic and Young Dutch and Wild Mallard, or the Wild Black.
3849–3850. Duck, White Aylesbury.
3851–3852. Duck, Black Cayuga.

TURKEYS.

3853–3854. Turkey, Wild Virginia.
3855. Turkey, Wild New Mexican.
3856–3857. Turkey, Bronze.
3858–3859. Turkey, White.

PEA-FOWL.

3860–3861. Pea-fowl, common.

GUINEA FOWLS.

3862. Guinea fowl, grown wild in Mexico.
3863–3864. Guinea fowl, Common speckled.
3865–3866. Guinea fowl, Common and half white.
3867–3868. Guinea fowl, Common and white.
3869. Guinea fowl, hybrid, said to be between Guinea fowl and common fowl.
3870. Guinea fowl, hybrid between turkey and common fowl.

DOMESTIC POULTRY, ETC.

3871–3872. Wild Jungle Fowl, (*Gallus sonnerattis*), said to be origin of domestic poultry.
3873–3874. Game, Black-breasted red.
3875–3876. Bantam, Golden Seabright.
3877–3878. Bantam, Silver Seabright.
3879–3880. Bantam, Duck-wing game.
3881–3882. Bantam, Black African.
3882–3883. Bantam, Spanish Black.
3884–3885. Bantam, Spanish White or White Leghorn.
3886–3887. Bantam, Creve-Cœur.
3888–3889. Bantam, Houdan.
3890–3891. Bantam, La Fleche.
3892–3893. Cochin Buff.
3894–3895. Cochin Partridge.
3896–3897. Gray, perhaps black.
3898–3899. Brahma, Dark.
3900–3901. Brahma, Light.
3902–3903. Polish Top-knot.
3904–3905. Hamburg, Gold-spangled.
3906–3907. Hamburg, Silver-spangled.
3908–3909. Leghorn, Brown.
3910–3911. Silky fowl or Cresp-feather.
3912–3913. Tailless fowl.
3914–3915. Dorking, Black.
3916–3917. Dorking, Gray.

PHEASANTS.

3918–3820. Pheasants, Golden and young, semi-domesticated.
3921–3924. Pheasants, Common European and young.
3925–3929. Pheasants, Silver and young.

PIGEONS.

3930–3931. Pigeon, Wild European Rock, said to be origin of domestic.
3932–3933. Pigeon, Domestic, closely resembling the Wild Rock, shot at Washington, D. C.

3934–3935. Pigeon, Archangel.
3936–3937. Pigeon, Black Trumpeter.
3938–3939. Pigeon, Barbs.
3940–3941. Pigeon, Carrier.
3942–3943. Pigeon, Carrier, Brown, said to be from South America.
3944–3945. Pigeon, Carrier, said by donor to be from South America.
3946–3947. Pigeon, Fantail, white.
3948–3949. Pigeon, Runtz, white.
3950–3951. Pigeon, Pouters.
3952–3953. Pigeon, Red Jacobins.
3954–3955. Pigeon, Turbit.
3956–3957. Pigeon, Unnamed.
3958–3960. Pigeon, Dove Ring pecked.

TOWNSEND GLOVER,
Entomologist.

HORTICULTURAL DIVISION.

HORTICULTURAL DIVISION.

The objects of the *horticultural and propagating division* were set forth in brief but comprehensive terms by William Saunders, the superintendent of the division, in the Commissioner's report for 1867:

> 1. To procure and encourage the transmission of seeds, cuttings, bulbs, and plants from all sources, both foreign and domestic, for the purpose of testing their merits and general adaptation, or for particular localities of this country. 2. To procure by hybridizing and special culture, products of a superior quality to any now existing. 3. To ascertain, by experiment, the influences of varied culture on products, and the modifications effected by the operations of pruning and other manipulations on trees and fruits. 4. To investigate more thoroughly the various maladies and diseases of plants, and the insects that destroy them. 5. To provide ample means for thoroughly testing samples of all seeds and other contributions that may be received. 6. To cultivate specimens of the various hedge plants, and exhibit their availability for that purpose. 7. To cultivate a collection of the best fruit trees and plants, such as grapes, apples, pears, peaches, strawberries, raspberries, currants, &c., so as to compare their respective merits. 8. To plant a collection of choice shrubs adapted for decorating gardens and landscape scenery. 9. To erect glass structures, for the twofold purpose of affording the necessary facilities for cultivating exotic fruits and plants, and to furnish examples of the best and most economical modes of constructing, heating, and managing such buildings.

These objects have been faithfully and systematically adhered to. Since 1862, the year in which the Department was organized, the present superintendent has had charge of the experimental garden, and since 1867 he has also had charge of the grounds surrounding the Department building. Prior to 1867 the experimental garden had shown the wisdom of the policy that had inaugurated the propagation of improved varieties of domestic fruits and of valuable seeds and plants the products of other lands. Since then there has been ample verge for experiments, for comparison, and for the exercise of such taste and the application of such skill as American horticulture demands. Every avenue to horticultural knowledge and kindred sciences has been opened to the public. The flower-garden, noticeable not more for the variety and luxuriance of its flowers than for the exquisite harmony of their arrangement. The conservatory, 320 feet long from east to west and reaching southward 150 feet from the center of its extreme length, with its perfect heating arrangements, its tropical and semi-tropical fruits, its foreign grapes, and its miscellaneous collection of useful foreign plants—dyes, gums, textiles, medicines, &c.; the arboretum, embracing as complete a collection of hardy trees and shrubs, arranged in family groups, as can be found in any country; the experimental fruit-orchard; the curved walks; the terrace; the smoothly-shaven lawns; the superb landscape effect; all these greet the eye of the visitor to the Department. If he will extend his walk to the experimental garden, he will be impressed with other lessons which cannot be learned so well out of books. The whole horticultural division is best comprehended when regarded as a living teacher, to be seen face to face, talked with and listened to. It is an educator, from which may be learned the names of the best fruits; the uses of a thousand foreign plants which are adapted to cultivation upon American soil; the diseases of grapes, pears, peaches, &c.; interesting results in hybridizing; the best methods of pruning, budding, and grafting; and, generally, the best methods of conducting all horticultural and fruit-growing enterprises.

A leading object of the horticultural division is to direct attention to such exotic plants as possess useful properties and are capable of adaptation to American climatic conditions. In pursuing this object the superintendent has aided greatly in giving proper direction to the enterprise of such citizens as would introduce new agricultural interests. This aid has been rendered mainly through the medium of official correspondence that is never published, but it has been none the less timely and valuable nevertheless. Coffee plantations cannot be successfully established in localities where the temperature ever falls below 45° F., a condition which nowhere exists in the United States; cinchona can be cultivated where the temperature does not fall below 32° F., a condition which is supposed to exist in Southern California; the tea plant and *Eucalyptus globulus* will succeed in some portions of the United States, but not in all; the olive will flourish in our Southern States, but its cultivation can scarcely ever be profitable, owing to its slow growth and the ease with which its oil may be counterfeited; the fig may be successfully cultivated as far north as Baltimore, and, although former efforts to properly cure the fruit have not been successful, the advice has been given to experiment with the recently improved artificial mode of drying fruits. These instances are given as illustrations of the character of the information furnished by the horticultural division from time to time in response to inquiries, and it is not the least of the achievements of the Department of Agriculture that this division has given advice that has stimulated enterprise in proper directions and prevented the sacrifice of fortunes in efforts that could only have proved unavailing.

The exhibit of the horticultural division at the International Exhibition, 1876, comprised—

1. Thirty-two photographic views of the grounds, showing characteristic groups of trees, the Department building, conservatories, terraces, pavilions, experimental garden, flower garden, and general landscape effects.

2. A collection of economic plants, as per list (A).

3. A detailed plan of the grounds and arboretum, with references, by figures, to the position of families, genera, and species, as per list marked B, which includes nearly all the ligneous plants fitted to succeed in the District of Columbia.

A.—ECONOMIC PLANTS.

Agave Americana	Pita fiber plant.
Agave sisalana	Sisal hemp plant.
Aleurites Moluccana	Candleberry tree.
Aloe socotrina	Bitter aloes.
Antiaris toxicaria	Upas tree.
Araucaria Bidwilli	Bunya nut tree.
Artanthe elongata	Matico.
Bambusa arundinacea	Bamboo cane.
Bixa Orellana	Arnotta plant.
Bohmeria nivea	Ramie.
Boldoa fragrans	Boldine.
Camphora officinarum	Camphor plant.
Carica Papaya	Tropical papaw tree.
Capparis spinosa	Caper bush.
Ceratonia Siliqua	Carob bean.
Chrysophyllum Cainito	Star apple.
Cinchona succirubra	Quinine tree.
Cinnamomum zeylanicum	Cinnamon tree.
Coffea Arabica	Coffee plant.
Croton Tiglium	Croton-oil plant.
Damara Australis	Damar resin pine.
Dracæna Draco	Dragon's blood tree.
Erythroxylon Coca	Coca leaf plant.
Eucalyptus globulus	Australian blue gum.
Eugenia Jambosa	Rose apple.
Ficus Indica	Banyan tree.
Ficus elastica	India-rubber tree.
Fourcroya Cubense	Cabuya fiber plant.
Hura crepitans	Sand box tree.
Ilex paraguayensis	Maté, Paraguaya tea.
Illicium anisatum	Star anise plant.
Indigofera tinctoria	Indigo plant.
Jatropha Curcas	Physic nut tree.
Mammea Americana	Mammee apple.
Manahot utilissima	Cassava, tapioca plant
Maranta arundinacea	Arrow-root plant.
Musa textilis	Manila hemp plant.
Musa Cavendishii	Dwarf banana.
Olea Europæa	European olive.
Phœnix dactylifera	Date palm.
Phormium tenax	New Zealand flax.
Photinia Japonica	Japan medlar.
Pinckneya pubens	Georgia fever tree.
Piper nigrum	Black pepper.
Psidium Cattleyanum	Purple guava.
Sapota Mulleri	Balata tree.
Saccharinum officinarum	Sugar cane.
Sanseviera guineensis	Bowstring hemp.
Tamarindus indica	Tamarind tree.
Thea viridis	Chinese tea plant.
Cereus giganteus	Gigantic cactus.

B.—DICOTYLEDONÆ.

ANGIOSPERMÆ.

POLYPETALÆ.

MAGNOLIACEÆ.

Magnolia acuminata.
Magnolia acuminata foliis variegata.
Magnolia Alexandrine.
Magnolia conspicua.
Magnolia conspicua speciosa.
Magnolia cordata.
Magnolia Fraseri.
Magnolia glauca.
Magnolia glauca Thomsoniana.
Magnolia gracilis.
Magnolia grandiflora.
Magnolia grandiflora Exoniensis.
Magnolia grandiflora rotundifolia.
Magnolia Halleana.
Magnolia Lenne.
Magnolia macrophylla.
Magnolia Norbertiana.
Magnolia purpurea.
Magnolia Soulangeana.
Magnolia superba.
Magnolia Umbrella.

SCHIZANDREÆ.

Kadsura Japonica.
Liriodendron tulipfera.
Liriodendron tulipifera acutifolium.
Liriodendron tulipifera integrifolium.
Schizandra coccinea.

ANONACEÆ.

Asimina parviflora.
Asimina triloba.

LARDIZABALACEÆ.

Akebia quinata.
Stauntonia latifolia.

MENISPERMACEÆ.

Calycocarpum Lyoni.
Cocculus Carolinus.
Menispermum Canadense.

BERBERIDACEÆ.

Berberis aristata.
Berberis Asiatica.
Berberis Canadensis.
Berberis corallina.
Berberis cratægina.
Berberis cuneata.
Berberis Darwinii.
Berberis dulcis.
Berberis emarginata.
Berberis empetrifolia.
Berberis Fischerii.
Berberis Hookeriana.
Berberis Iberica.
Berberis illicifolia.
Berberis Jamiesonii.
Berberis Nubertii.
Berberis Siberica.
Berberis Sinensis.
Berberis stenophylla.
Berberis vulgaris.
Berberis vulgaris alba.
Berberis vulgaris asperma,
Berberis vulgaris atropurpurea.
Berberis vulgaris aurea marginata.
Berberis vulgaris laxa.
Berberis vulgaris lutea.
Berberis vulgaris provincialis.
Berberis vulgaris spathulata.
Berberis vulgaris variegata.
Berberis vulgaris violacea.
Mahonia aquifolium.
Mahonia Beallii.
Mahonia fascicularis.
Mahonia Fortunii.
Mahonia intermedia.
Mahonia Japonica.
Mahonia Leschenaultii.
Mahonia Nepalensis.
Mahonia nervosa.
Mahonia repens.

HYPERICACÆ.

Hypericum calycinum.
Hypericum elatum.
Hypericum hircinum.
Hypericum Kalmianum.
Hypericum prolificum.
Hypericum prolificum densiflorum.
Androsæmum officinalis Allioni.

MALVACEÆ.

Hibiscus Syriacus.
Hibiscus Syriacus alba flore pleno.
Hibiscus Syriacus cerulea flore pleno.
Hibiscus Syriacus fleur. blanch.

B.—DICOTYLEDONÆ—Continued.

Hibiscus Syriacus fol. aurea variegata.
Hibiscus Syriacus paeoniflora.
Hibiscus Syriacus purpurea.
Hibiscus Syriacus rubra flore pleno.
Hibiscus Syriacus speciosa.
Hibiscus Syriacus variegata.
Hibiscus Syriacus variegata flore pleno.

STERCULIACEÆ.

Sterculia platanifolia.

TILIACEÆ.

Tilia Americana.
Tilia Americana heterophylla.
Tilia pubescens.
Tilia pubescens leptophylla.
Tilia Europaea.
Tilia Europaea alba.
Tilia Europaea asplenifolia.
Tilia Europaea aurea.
Tilia Europaea aurea macrophylla.
Tilia Europaea latifolia.
Tilia Europaea cordata.
Tilia Europaea dasystyla.
Tilia Europaea gigantea.
Tilia Europæa grandifolia aurea.
Tilia Europaea laciniata.
Tilia Europaea maculata.
Tilia Europaea microphylla.
Tilia Europaea parvifolia.
Tilia Europaea pendula variegata aurea.
Tilia Europaea platyphylla.
Tilia Europaea rubra.
Tilia Europaea vitifolia.

CAMELLIACEÆ.

Gordonia Lasianthus.
Stuartia pentagyna.
Stuartia Virginica.

MELIACEÆ.

Melia Azederach.

RUTACEÆ.

Aliantus glandulosa.
Ptelea mollis.
Ptelea trifoliata.
Ptelea trifoliata variegata.
Zanthoxylum Americanum.
Zanthoxylum Carolinianum.

CORIARIEÆ.

Coriaria microphylla.
Coriaria myrtifolia.
Coriaria ruscifolia.

ANACARDIACEÆ

Rhus aromatica.
Rhus copallina.
Rhus cotinoides.
Rhus Cotinus.
Rhus glabra.
Rhus typhina.
Rhus venenata.
Pistacia Lentiscus.
Pistacia Terebinthus.

RHAMNACEÆ.

Berchemia volubilis.
Ceanothus Americanus.
Ceanothus azureus.
Ceanothus Delianris.
Ceanothus dentatus.
Ceanothus divaricatus.
Ceanothus Fontanesianus.
Ceanothus Hartwegii.
Ceanothus ovalis.
Ceanothus pappilosus.
Ceanothus rigidus.
Ceanothus thyrsiflorus.
Ceanothus Veitchianus.
Ceanothus velutinus.
Frangula Caroliniana.
Paliurus aculeatus.
Rhamnus Alaternus.
Rhamnus Alaternus angustifolia.
Rhamnus Alaternus argenteais.
Rhamnus Alaternus maculata.
Rhamnus alnifolius.
Rhamnus Alpinus.
Rhamnus Californicus.
Rhamnus catharticus.
Rhamnus clorophorus.
Rhamnus Erythroxylon.
Rhamnus infectorius.
Rhamnus lanceolatus.
Rhamnus latifolius.
Rhamnus saxatilis.
Rhamnus utilis.
Sageretia Michauxii.
Ziziphus vulgaris.

CELASTRACEÆ.

Celastrus scandens.
Enonymus Americanus.
Enonymus Americanus obvatus.
Euonymus angustifolius.
Enonymus atropurpureus.
Enonymus Europaeus.

B.—DICOTYLEDONÆ—Continued.

Euonymus Europæus albo fructo.
Euonymus Europæus latifolius.
Euonymus Europæus nana.
Euonymus Europæus rubra fructo.
Euonymus Europæus verrucosus.
Euonymus Hamiltonianus.
Euonymus Japonicus fol. variegata.
Euonymus Japonicus.
Euonymus Japonicus fol. argentea.
Euonymus Japonicus fol. aureus.
Euonymus Japonicus fol. crispus.
Euonymus latifolia alba.
Euonymus linifolius.
Euonymus nana.
Euonymus radicans fol. variegata.

SAPINDACEÆ.

Staphylea Colchica.
Staphylea pinnata.
Staphylea trifolia.
Æsculus Californica.
Æsculus Canadensis.
Æsculus crispa.
Æsculus dubia.
Æsculus flava.
Æsculus flava purpurascens.
Æsculus flava variegata.
Æsculus glabra.
Æsculus Hippocastanus.
Æsculus Hippocastanus flore pleno.
Æsculus Hippocastanus flore pleno alba.
Æsculus Hippocastanus flore pleno rubra.
Æsculus neglecta.
Æsculus nigrum.
Æsculus parviflora.
Æsculus Pavia.
Æsculus Pavia pendula.
Æsculus Pavia rubra.
Æsculus praecox.
Æsculus procera.
Æsculus rubicunda.
Æsculus rubicunda fol. variegata.
Æsculus rubicunda pubescens.
Æsculus spectabilis.
Æsculus variegata argentea.
Æsculus Whitlejii coccinea.
Kolreuteria paniculata.
Acer Atheniense.
Acer campestre.
Acer campestre Austricum.
Acer campestre foliis variegata.
Acer campestre laevigatum.
Acer circinatum.
Acer Colchicum.
Acer Colchicum rubra.
Acer coriaceum.
Acer Creticum.
Acer cristata.
Acer dasycarpum.
Acer dasycarpum laciniata.
Acer dasycarpum laciniata foliis aurea.
Acer dasycarpum pendula.
Acer Douglassi.
Acer fulgens.
Acer hybridum.
Acer Japonica.
Acer Japonica atropurpurea.
Acer Japonica variegata.
Acer Leopoldii.
Acer macrophyllum.
Acer Monspessalanum.
Acer Murrayanum.
Acer Nepalense.
Acer obtusatum.
Acer Opulus.
Acer Pennsylvanicum.
Acer platanoides.
Acer platanoides dissectum.
Acer platanoides laciniatum.
Acer platanoides Lobelii.
Acer platanoides occulatum.
Acer platanoides Schwedlerii.
Acer polymorphum atropurpureum.
Acer polymorphum palmatum.
Acer polymorphum pinnatifidum.
Acer polymorphum variegatum.
Acer Pseudo-Platanus.
Acer Pseudo-Platanus alba.
Acer Pseudo-Platanus aurea.
Acer Pseudo-Platanus flava.
Acer Pseudo-Platanus foliis aurea.
Acer Pseudo-Platanus laciniatum.
Acer Pseudo-Platanus longifolia.
Acer Pseudo-Platanus purpurea.
Acer Pseudo-Platanus nova.
Acer Pseudo-Platanus obtusa.
Acer rubrum.
Acer rubrum pyramidalis.
Acer saccharinum.
Acer saccharinum nigrum.
Acer spicatum.
Acer Tartaricum.
Acer Tauricum.
Acer tricolor.
Negundo aceroides.
Negundo aceroides argentea.
Negundo aceroides crispum.
Negundo aceroides lutea.

B.—DICOTYLEDONÆ—Continued.

Negundo aceroides variegata alba.
Negundo aceroides violacea.

LEGUMINOSÆ.

Amorpha canescens.
Amorpha dealbata.
Amorpha fragrans.
Amorpha fragrans nana.
Amorpha fruticosa.
Amorpha glabra.
Caragana Altagana.
Caragana arborescens.
Caragana arenaria.
Caragana Chamlagu.
Caragana frutescens.
Caragana gracilis pendula.
Caragana microphylla.
Caragana pygmaea.
Caragana Redowskii.
Caragana spinosa.
Caragana tragacanthoides.
Colutea aborescens.
Colutea cruenta.
Cytisus abliflorus.
Cytisus atropurpureus.
Cytisus Austriacus.
Cytisus biflorus.
Cytisus capitatus.
Cytisus elongatus.
Cytisus hirsutus.
Cytisus incarnatus.
Cytisus latifolius.
Cytisus leucanthus.
Cytisus nigricans.
Cytisus purpureus.
Cytisus secundus.
Cytisus spinosus.
Cytisus triflorus.
Genista angelica.
Genista capitata
Genista Germanica.
Genista Hispanica.
Genista horrida.
Genista pilosa.
Genista prostrata.
Genista purgans.
Genista radiata.
Genista sagitallis.
Genista Siberica.
Genista tinctoria.
Genista tinctoria flore pleno.
Genista triquetra.
Halimodendron argenteum.
Laburnum Alpinus.
Laburnum Alpinus annularis.
Laburnum Alpinus hybridus.
Laburnum Alpinus odoratus.
Laburnum Alpinus Parksii.
Laburnum Alpinus pendulus.
Laburnum Alpinus Waterii.
Laburnum sessilifolus.
Laburnum vulgare.
Laburnum vulgare foliis variegata.
Laburnum vulgare fragrans.
Laburnum vulgare latifolium.
Laburnum vulgare purpurascens.
Laburnum vulgare quercifolium.
Ononis fruticosa.
Ononis rotundifolia.
Robinia hispida.
Robinia Elliottii.
Robinia Gordoniana.
Robinia macrophylla.
Robinia nana.
Robinia rosea.
Robinia Pseudacacia.
Robinia Pseudacacia amorphaefolia.
Robinia Pseudacacia bella.
Robinia Pseudacacia Bessoniana.
Robinia Pseudacacia crispa.
Robinia Pseudacacia Decaisneana.
Robinia Pseudacacia fastigiata.
Robinia Pseudacacia gigantea.
Robinia Pseudacacia gracilis.
Robinia Pseudacacia inermis.
Robinia Pseudacacia microphylla.
Robinia Pseudacacia macrophylla.
Robinia Pseudacacia monstrosa.
Robinia Pseudacacia monophylla.
Robinia Pseudacacia pendula.
Robinia Pseudacacia procera.
Robinia Pseudacacia pyramidalis.
Robinia Pseudacacia spectabilis.
Robinia Pseudacacia stricta.
Robinia Pseudacacia tortuosa.
Robinia Pseudacacia umbraculifera.
Robinia viscosa.
Sarothamnus Scoparius.
Sarothamnus Scoparius albus.
Spartium junceum.
Spartium junceum flore pleno.
Ulex Europaea.
Ulex Europaea flore pleno.
Ulex nana.
Ulex stricta.
Wistaria Chinensis.
Wistaria frutescens.
Wistaria frutescens alba.

B.—DICOTYLEDONÆ—Continued.

Wistaria frutescens brachyletra.
Wistaria frutescens brachyletra rubra.
Coronilla Emerus.
Sophora Japonica.
Sophora Japonica pendula.
Sophora Japonica variegata.
Cladrastis tinctoria.
Cercis Canadensis.
Cercis carnea.
Cercis Siliquastrum.
Cercis variegata.
Gleditschia Riogoti pendula.
Gleditschia Caspica.
Gleditschia Fontanesii.
Gleditschia latisiliqua.
Gleditschia macracantha.
Gleditschia monosperma.
Gleditschia sinensis.
Gleditschia sinensis inermis.
Gleditschia sinensis purpurea.
Gleditschia triacanthos.
Gleditschia triacanthos inermis.
Gymnocladus Canadensis.
Albizzia Julibrissin.

ROSACEÆ.

Amygdalopsis Lindleyii.
Amygdalus communis.
Amygdalus communis amara.
Amygdalus communis aurea stricta.
Amygdalus communis dulcis.
Amygdalus communis flore pleno.
Amygdalus communis macrocarpa.
Amygdalus communis pendula.
Amygdalus Dianthifolia.
Amygdalus jaspida.
Amygdalus nana incana.
Amygdalus pendunculata.
Amygdalus Persica caryophyllus.
Amygdalus Persica communis.
Amygdalus Persica flore pleno.
Amygdalus Persica rosea flore pleno.
Amygdalus Persica sanguinea pleno.
Amygdalus Persica versicolor flore pleno.
Amygdalus pumila alba plena.
Amygdalus pumila rosea plena.
Prunus Americana.
Prunus Brigantiae.
Prunus Californica.
Prunus Chicasa.
Prunus domestica flore pleno.
Prunus domestica variegata.
Prunus domestica variegata aurea.
Prunus maritima.
Prunus myrobolana.
Prunus pumila.
Prunus spinosa.
Prunus spinosa flore pleno.
Prunus spinosa institia.
Prunus Avium.
Prunus Avium duracina flore pleno
Prunus Avium Juliana.
Prunus Avium Juliana pendula.
Prunus Avium Juliana variegata.
Prunus Avium pendula.
Prunus Cerasus.
Prunus Cerasus flore pleno.
Prunus Cerasus Gallica.
Prunus Cerasus marasca.
Prunus Cerasus nicotenæfolia.
Prunus Cerasus semipleno.
Prunus Cerasus variegata.
Prunus glaucifolia.
Prunus ilicifolia.
Prunus intermedia.
Prunus Japonica.
Prunus Laurocerasus.
Prunus Laurocerasus Caucasica.
Prunus Laurocerasus Colchica.
Prunus Laurocerasus falcata.
Prunus Laurocerasus intermedia.
Prunus Laurocerasus Jeffreyi.
Prunus Laurocerasus pygmæa.
Prunus Laurocerasus variegata.
Prunus Lusitanica.
Prunus maculata.
Prunus Mahaleb.
Prunus Mahaleb variegata.
Prunus Padus.
Prunus Padus aucubæfolia.
Prunus Padus bracteosa.
Prunus Padus flore pleno.
Prunus Padus latifolia.
Prunus Padus variegata.
Prunus Pennsylvanica.
Prunus semperflorens.
Prunus serotina.
Prunus serrulata.
Prunus Virginiana.
Kerria Japonica.
Kerria Japonica flore pleno.
Kerria Japonica variegata.
Kerria ramolus.
Schizonotus Lindleyana.
Schizonotus sorbifolia.
Schizonotus sorbifolia alpina.
Spiræa alnifolia.
Spiræa alpina.

B.—DICOTYLEDONÆ—Continued.

Spiræa amœna.
Spiræa ariifolia.
Spiræa bella.
Spiræa bella carnea.
Spiræe Blumei.
Spiræa Billardii.
Spiræa callosa.
Spiræa callosa alba.
Spiræa cana.
Spiræa carpinæfolia.
Spiræa chamædrifolia.
Spiræa corymbosa.
Spiræa cratægifolia.
Spiræa cuneifolia.
Spiræa Douglasii.
Spiræa eximia.
Spiræa flexuosa.
Spiræa floribunda.
Spiræa grandiflora.
Spiræa hypericifolia.
Spiræa Hookeriana.
Spiræa incarnata.
Spiræa laccata.
Spiræa laciniata.
Spiræa laevigata.
Spiræa Lindleyana.
Spiræa Nepalensis.
Spiræa Nicondertii.
Spiræa Nobleana.
Spiræa nutans.
Spiræa opulifolia.
Spiræa opulifolia aurea.
Spiræa opulus.
Spiræa pachystachys.
Spiræa paniculata.
Spiræa prunifolia flore pleno.
Spiræa Reevesii.
Spiræa Reevesii flore pleno.
Spiræa Regeliana.
Spiræa rhombifolia.
Spiræa robusta.
Spiræa rotundifolia.
Spiræa salicifolia.
Spiræa salicifolia alpestris.
Spiræa salicifolia carnea.
Spiræa salicifolia pissa.
Spiræa semperflorens.
Spiræa sinensis.
Spiræa thalictroides.
Spiræa Thunbergiana.
Spiræa tomentosa.
Spiræa trilobata.
Spiræa ulmifolia.
Spiræa vaccinæfolia.
Potentilla fruticosa.
Potentilla fruticosa Dahurica.
Potentilla fruticosa tenuiloba.
Potentilla glabra.
Rubus cæsius.
Rubus fructicosus.
Rubus fructicosus flore pleno.
Rubus fructicosus laciniatus.
Rubus fructicosus rubra.
Rubus fructicosus superba.
Rubus fructicosus variegatus.
Rubus leucodermis.
Rubus Nutkanus.
Rubus odoratus.
Rubus rupestris.
Rubus spectabilis.
Rubus suberectus.
Amelanchier Canadensis.
Amelanchier Canadensis alnifolia.
Amelanchier Canadensis Botryapium.
Amelanchier Canadensis oblongifolia.
Amelanchier Canadensis oligocarpa.
Amelanchier Canadensis rotundifolia.
Amelanchier floribunda.
Amelanchier florida.
Amelanchier latifolia.
Amelanchier vulgaris.
Cotoneaster acuminata.
Cotoneaster affinis.
Cotoneaster buxifolia.
Cotoneaster compacta.
Cotoneaster frigida.
Cotoneaster Hookeriana.
Cotoneaster lanata.
Cotoneaster laxiflora.
Cotoneaster macrophylla.
Cotoneaster nummularia.
Cotoneaster rotundifolia.
Cotoneaster rupestris.
Cotoneaster Simondsii.
Cotoneaster thymifolia.
Cotoneaster tomentosa.
Cotoneaster uniflora.
Cotoneaster vulgaris.
Cotoneaster Wheelerii.
Cratægus acerifolia.
Cratægus Aronia.
Cratægus apiifolia.
Cratægus Azerolus.
Cratægus coccinea.
Cratægus cordata.
Cratægus Crus-galli.
Cratægus Crus-galli prunifolia.
Cratægus Douglasii.

B.—DICOTYLEDONÆ—Continued.

Cratægus flava.
Cratægus flava pubescens.
Cratægus floribunda.
Cratægus heterophylla Fluggo.
Cratægus intermedia.
Cratægus latifolia.
Cratægus labata.
Cratægus lucida odorata.
Cratægus Macnabiana.
Cratægus macracantha.
Cratægus melanocarpa.
Cratægus Mexicana.
Cratægus nigra.
Cratægus obtusifolia.
Cratægus orientalis.
Cratægus Oxycantha.
Cratægus Oxycantha Celliana.
Cratægus Oxycantha Guthrieana.
Cratægus Oxycantha laciniata pendula.
Cratægus Oxycantha lutea.
Cratægus Oxycantha mespilus.
Cratægus Oxycantha monogynia.
Cratægus Oxycantha Oliveriana.
Cratægus Oxycantha pendula variegata.
Cratægus Oxycantha pendula pyracanthifolia.
Cratægus Oxycantha pleno alba.
Cratægus Oxycantha punicea.
Cratægus Oxycantha punicea flore pleno.
Cratægus Oxycantha quercifolia.
Cratægus Oxycantha regina pendula.
Cratægus Oxycantha spinosissima.
Cratægus Oxycantha stricta.
Cratægus Oxycantha tanacetifolia.
Cratægus Oxycantha tortuosa.
Cratægus Oxycantha variegata aurea.
Cratægus Oxycantha variegata argentea.
Cratægus parvifolia.
Cratægus parviflora grossulariefolia.
Cratægus purpurea.
Cratægus pumila.
Cratægus Pyracantha.
Cratægus Pyracantha crenulatha.
Cratægus Pyracantha implexa.
Cratægus spathulata.
Cratægus tomentosa.
Cratægus tomentosa punctata.
Cratægus tomentosa punctata aurea.
Cratægus tomentosa punctata rubra.
Cratægus tomentosa punctata rubra stricta.
Cratægus tomentosa variegata pyrifolia.
Cratægus trilobata.
Cydonia Japonica.
Cydonia Japonica Aurora.
Cydonia Japonica albacincta.
Cydonia Japonica atro-sanguinea.
Cydonia Japonica aurantiaca.
Cydonia Japonica candidissima.
Cydonia Japonica flore alba.
Cydonia Japonica flore pleno.
Cydonia Japonica grandiflora.
Cydonia Japonica Mallardii.
Cydonia Japonica Moerloozii.
Cydonia Japonica Princesse Emilie.
Cydonia Japonica umbellata.
Cydonia sinensis.
Mespilus Germanica.
Mespilus Smithii.
Photinia dentata.
Photinia serrulata.
Pyrus acerifolia.
Pyrus Americana.
Pyrus Americana fastigiata.
Pyrus Americana flore albo pleno.
Pyrus Americana rubra pleno.
Pyrus amygdaliformis.
Pyrus angustifolia.
Pyrus arbutifolia.
Pyrus arbutifolia erythrocarpa.
Pyrus arbutifolia melanocarpa.
Pyrus Aria.
Pyrus Aria latifolia.
Pyrus Aria nivea.
Pyrus Aria undulata.
Pyrus Aucuparia.
Pyrus Aucuparia Astracanica expansa.
Pyrus Aucuparia Astracanica fastigiata.
Pyrus Aucuparia fastigiata.
Pyrus Aucuparia foliis variegata.
Pyrus Aucuparia fructo-luteo.
Pyrus Aucuparia pendula.
Pyrus aurea hybrida.
Pyrus baccata.
Pyrus baccata coccinea.
Pyrus Bolwylleriana.
Pyrus Chamœmespilus.
Pyrus communis flore pleno.
Pyrus communis foliis variegatis.
Pyrus communis fructu variegatis.
Pyrus communis jaspida.
Pyrus coronaria.
Pyrus domestica.
Pyrus dulcis.
Pyrus elægnifolia.
Pyrus floribunda.
Pyrus flutex dwarf.
Pyrus heterophylla.

B.—DICOTYLEDONÆ—Continued.

Pyrus hybrid large.
Pyrus hybrid dwarf.
Pyrus intermedia.
Pyrus lanuginosa.
Pyrus Malus argentea marginata.
Pyrus Malus aurea nervosa.
Pyrus Malus foliis argenters.
Pyrus Malus jaspida.
Pyrus Malus maculata.
Pyrus Malus Nepalensis.
Pyrus Malus nivalis.
Pyrus Maulei.
Pyrus nana floribunda.
Pyrus pinnatifida.
Pyrus pinnatifida arbuscula.
Pyrus prunifolia.
Pyrus prunifolia coccinea.
Pyrus prunifolia hybrida.
Pyrus prunifolia pulveriana.
Pyrus prunifolia Rigno.
Pyrus prunifolia salicifolia.
Pyrus prunifolia sinensis.
Pyrus quercifolia.
Pyrus Sambucæfolia.
Pyrus Sorbus.
Pyrus spectabilis.
Pyrus spectabilis albo pleno.
Pyrus spectabilis flore pleno.
Pyrus spectabilis foliis variegata.
Pyrus spectabilis Semi-pleno.
Pyrus Spuria.
Pyrus Theoprastii.
Pyrus Toringo.
Pyrus undulata.
Pyrus variolosa.
Pyrus vestita.

CALYCANTHACÆ.

Calycanthus floridus.
Calycanthus glaucus.
Calycanthus heterophyllum.
Calycanthus laevigatus.
Calycanthus macropyllus.
Calycanthus prunifolia.
Chimonanthus fragrans.
Chimonanthus fragrans aurantiacus.
Chimonanthus fragrans grandiflorus.

MYRTACEÆ.

Punica granatum.
Punica granatum Legrellii.

LYTHRACEÆ.

Lagerstræmia Indica.
Lagerstræmia purpurea.
Lagerstræmia regina.
Lagerstræmia rubra.
Lagerstræmia violacea.

TAMIRICACEÆ.

Myricaria Germanica.
Tamarix Africana.
Tamarix gallica.
Tamarix Indica.

GROSSULACEÆ.

Ribes alpinum.
Ribes aureum.
Ribes aureum fragrans.
Ribes Benthamii.
Ribes cerasiforme.
Ribes cereum.
Ribes Cynosbati.
Ribes diacantha.
Ribes floridum.
Ribes Gordonianum.
Ribes gracile.
Ribes grossulariodes.
Ribes hirtellum.
Ribes lacustre.
Ribes Loudonianum.
Ribes Menziesii.
Ribes nigrum.
Ribes nigrum foliis variegata.
Ribes nigrum fructu-viride.
Ribes nigrum laciniatum.
Ribes niveum.
Ribes prostratum.
Ribes rotundifolium.
Ribes rubrum.
Ribes sanguineum.
Ribes sanguineum atro-sanguineum.
Ribes sanguineum flore-albo.
Ribes sanguineum pleno.
Ribes saxatile.
Ribes speciosum.
Ribes tenuiflorum.

SAXIFRAGACEÆ.

Itea Virginica.
Decumaria barbara.
Deutzia crenata.
Deutzia crenata flore pleno.
Deutzia corymbosa.
Deutzia gracilis.
Deutzia scabra.
Deutzia sinensis.

B.—DICOTYLEDONÆ—Continued.

Deutzia staminea.
Hydrangea aborescens.
Hydrangea Hortensia.
Hydrangea Japonica.
Hydrangea paniculata.
Hydrangea quercifolia.
Hydrangea radiata.
Philadelphus Columbiana.
Philadelphus coronarius.
Philadelphus coronarius flore pleno.
Philadelphus coronarius nanus.
Philadelphus coronarius variegatus.
Philadelphus floribundus.
Philadelphus Gordonianus.
Philadelphus hirsutus.
Philadelphus inodorus.
Philadelphus inodorus grandiflorus.
Philadelphus laxus
Philadelphus Mexicanus.
Philadelphus verrucosus.
Philadelphus verrucosus latifolius.
Philadelphus verrucosus speciosus.
Philadelphus Zeyherii.

HAMAMELACEÆ.

Hamamelis arborea.
Hamamelis Virginica.
Fothergilla alnifolia.
Liquidambar imberbe.
Liquidambar styraciflua.

UMBELLIFERÆ.

Bupleurum fruticosum.

ARALIACEÆ.

Aralia Japonica.
Aralia juglandifolia.
Aralia spinosa.
Hedera Helix.
Hedera Helix Algeriensis.
Hedera Helix Hibernica.
Hedera Helix Hibernica variegatis.
Hedera Helix variegata argenta.
Hedera Taurica.
Hedera Raegneriana.

CORNACEÆ.

Benthamia fragifera.
Cornus alternifolia.
Cornus asperifolia.
Cornus Canadensis.
Cornus circinata.
Cornus florida.
Cornus grandis.
Cornus mascula.
Cornus mascula variegata.
Cornus paniculata.
Cornus sanguinea.
Cornus sanguinea variegata.
Cornus sericea.
Cornus Sibirica.
Cornus Sibirica variegata.
Cornus stolonifera.
Cornus stricta.
Garrya elliptica.
Nyssa aquatica.
Nyssa multiflora.
Nyssa uniflora.

MONOPETALÆ.

CAPRIFOLIACEÆ.

Diervilla amabilis hortensis rubra.
Diervilla amabilis Steznerii.
Diervilla amabilis Van Houtei.
Diervilla corascensis.
Diervilla corascensis alba.
Diervilla corascensis Groenewegenii.
Diervilla corascensis Isoline.
Diervilla corascensis nivea multiflora.
Diervilla corascensis stricta.
Diervilla Japonica.
Diervilla Japonica aurea.
Diervilla Japonica Desboisii.
Diervilla Japonica flore pleno.
Diervilla Japonica nana variegata.
Diervilla Japonica variegata argentea.
Diervilla sessilifolia.
Diervilla trifida.
Leycesteria formosa.
Leycesteria Nepalensis.
Linnæa borealis.
Lonicera Alpigena.
Lonicera affinis.
Lonicera brachypoda.
Lonicera brachypoda aureum reticulatum.
Lonicera Brownii.
Lonicera Canadensis.
Lonicera cerulea.

B.—DICOTYLEDONÆ—Continued.

Lonicera ciliata.
Lonicera confusa.
Lonicera diversifolia.
Lonicera etruscum.
Lonicera Fenesii.
Lonicera flava.
Lonicera fragrantissima.
Lonicera grata.
Lonicera Hallieana.
Lonicera hirsuta.
Lonicera Iberica.
Lonicera implexa.
Lonicera Ledebourii.
Lonicera Magnevillæ.
Lonicera magnifica.
Lonicera oblongiflora.
Lonicera occidentalis.
Lonicera pallida.
Lonicera parviflora.
Lonicera parviflora coccinea.
Lonicera parviflora Douglasii.
Lonicera Periclymenum.
Lonicera Periclymenum aurea.
Lonicera Periclymenum Belgica.
Lonicera Periclymenum quercifolium.
Lonicera Periclymenum serotinum.
Lonicera pulverulenta.
Lonicera Pyrenaica.
Lonicera Serotinum.
Lonicera Sheperdii.
Lonicera speciosa.
Lonicera Standishii.
Lonicera Tartarica.
Lonicera Tartarica alba.
Lonicera Tartarica grandiflora.
Lonicera Tartarica rubra.
Lonicera Xyloteum.
Symphoricarpus glaucus.
Symphoricarpus montanus.
Symphoricarpus occidentalis.
Symphoricarpus racemosas.
Symphoricarpus vulgaris.
Symphoricarpus vulgaris foliis variegatis
Sambucus Canadensis.
Sambucus nigra.
Sambucus nigra aurea.
Sambucus nigra fastigiata.
Sambucus nigra heterophylla.
Sambucus nigra laciniata.
Sambucus nigra leucocarpa.
Sambucus nigra monstrosa.
Sambucus nigra rotundifolia.
Sambucus nigra variegata argentea.
Sambucus pubens.
Sambucus racemosa.
Sambucus racemosa virescens.
Viburnum acerifolium.
Viburnum anglicum.
Viburnum cylindriacum.
Viburnum dentatum.
Viburnum lantana.
Viburnum lantana aurea marginata.
Viburnum lantana foliis variegata.
Viburnum lantanoides.
Viburnum Lentago.
Viburnum macrocephalum.
Viburnum nudum.
Viburnum nudum Cassinoides.
Viburnum nudum Claytonii.
Viburnum obovatum.
Viburnum Opulus.
Viburnum Opulus Aterilis.
Viburnum Opulus nana.
Viburnum pauciflorum.
Viburnum plicatum.
Viburnum prunifolium.
Viburnum pubescens.
Viburnum rugosum.
Viburnum Towardii.

RUBIACEÆ.

Cephalanthus occidentalis.
Gelsemium Sempervirens.

COMPOSITÆ.

Baccharis angustifolia.
Baccharis glomeruliflora.
Baccharis halimifolia.
Iva frutescens.
Artemisa Abrotanus.
Artemisa arborescens.
Artemisa Tobolskianum.

ERICACEÆ.

Chiogenes hispidula.
Gaylussacia brachycera.
Gaylussacia dumosa.
Gaylussacia frondosa.
Gaylussacia resinosa.
Gaylussacia ursina.
Vaccinium arboreum.
Vaccinium caespitosum.
Vaccinium Canadense.
Vaccinium Constableii.
Vaccinium corymbosum.
Vaccinium corymbosum amænum.
Vaccinium corymbosum atrococcum.
Vaccinium corymbosum glabrum.

B.—DICOTYLEDONÆ—Continued.

Vaccinium corymbosum pallidum.
Vaccinium crassifolium.
Vaccinium Elliottii.
Vaccinium erythrocarpon.
Vaccinium hirsutum.
Vaccinium macrocarpon.
Vaccinium Oxycoccus.
Vaccinium Pennsylvanicum.
Vaccinium stamineum.
Vaccinium uliginosum.
Vaccinium vacillans.
Vaccinium Vitis-Idæa.
Vaccinium Vitis-Idæa variegata.
Andromeda ferruginea.
Andromeda floribunda.
Andromeda ligustrina.
Andromeda mariana.
Andromeda nitida.
Andromeda polifolia.
Andromeda speciosa.
Arbutus hybrida.
Arbutus procera.
Arbutus tomentosa.
Arbutus Unedo.
Arctostaphylos alpina.
Arctostaphylos Uva-Ursi.
Azalea arborescens.
Azalea calendulacea.
Azalea nudiflora.
Azalea viscosa.
Azalea viscosa glauca.
Azalea viscosa nitida.
Cassandra calyculata.
Cassiope hypnoides.
Cassiope tetragona.
Clethra acuminata.
Clethra alnifolia.
Dabœcia polifolia.
Dabœcia polifolia flore albo.
Epigæa repens.
Kalmia angustifolia.
Kalmia cuneata.
Kalmia glauca.
Kalmia glauca rosmarinifolia.
Kalmia hirsuta.
Kalmia latifolia.
Kalmia myrtifolia.
Kalmia nana.
Ledum latifolium.
Ledum palustre.
Leucothœ acuminata.
Leucothœ axillaris.
Leucothœ Catesbæi.
Leucothœ racemosa.
Leucothœ recurva.
Leiophyllum buxifolium.
Loiseleuria procumbens.
Menziesia ferruginea.
Menziesia ferruginea globularis.
Menziesia globosa.
Menziesia globosa flore albo.
Oxydendrum arboreum.
Pernettya floribunda.
Pernettya mucronata.
Phyllodoce taxifolia.
Rhododendron Catawbiense.
Rhododendron Dauricum.
Rhododendron hirsutum.
Rhododendron Lapponicum.
Rhododendron maximum.
Rhododendron punctatum.
Rhodora Canadensis.

AQUIFOLIACEÆ.

Ilex Aquifolium.
Ilex Aquifolium angusta marginatum.
Ilex Aquifolium ferox.
Ilex Aquifolium ferox argenteum.
Ilex Aquifolium ferox argenteum screw leaved.
Ilex Aquifolium ferox argenteum hedgehog.
Ilex Aquifolium laurifolia.
Ilex Aquifolium media-picta variegatum.
Ilex Aquifolium pictum.
Ilex Aquifolium purpureum.
Ilex Aquifolium quadricolor.
Ilex Aquifolium Reginea.
Ilex Aquifolium regidum marginatum.
Ilex Balearica.
Ilex Balearica variegata.
Ilex Cassine.
Ilex Castanifolia.
Ilex cornuta.
Ilex crenata.
Ilex Dahoon.
Ilex Dahoon myrtifolia.
Ilex Dahoon myrtifolia aurea.
Ilex dipyrena.
Ilex furcata.
Ilex latispina minor.
Ilex latifolia.
Ilex macrocarpa.
Ilex Magellanica.
Ilex opaca.
Ilex rigida.
Ilex Turago.

B.—DICOTYLEDONÆ—Continued.

Ilex Amelanchier.
Ilex decidua.
Ilex monticola.
Ilex coriacea.
Ilex glabra.
Ilex lævigata.
Ilex lanceolata.
Ilex verticillata.
Myginda myrtifolia.
Nemopanthes Canadensis.

STYRACEÆ.

Halesia diptera.
Halesia parviflora.
Halesia tetraptera.
Styrax Americanum.
Styrax Californica.
Styrax grandifolia.
Styrax pulverulenta.
Symplocos tinctoria.

CYRILLACEÆ.

Cyrilla racemiflora.
Elliottia racemosa.

EBENACEÆ.

Diospyrus Lotus.
Diospyrus Virginiana.

SAPOTACEÆ.

Bumelia lanuginosa.
Bumelia lanuginosa oblongifolia.
Bumelia lycioides.
Bumelia reclinata.
Bumelia tenax.

BIGNONIACEÆ.

Bignonia capreolata.
Catalpa bignoniodes.
Catalpa Bungeii.
Catalpa Kæmpferii.
Catalpa umbraculifera.
Tecoma grandiflora.
Tecoma radicans.

SCROPHULARIACEÆ.

Paulownia Imperialis.
Buddlea Lindleyana.

VERBENACEÆ.

Callicarpa Americana.
Vitex Agnus-castus.
Vitex Agnus-castus latifolia.
Vitex incisa.

ASCLEPIADACEÆ.

Periploca Græca.

JASMINACEÆ.

Jasminum chrysantha.
Jasminum fruticans.
Jasminum humile.
Jasminum nudiflorum.
Jasminum ochroleuca.
Jasminum officinale.
Jasminum officinale variegata.
Jasminum pubigerum.
Jasminum revolutum.
Jasminum triumphans.

OLEACEÆ.

Chionanthus Virginica.
Chionanthus Virginica maritima.
Ligustrum aureum.
Ligustrum buxifolium.
Ligustrum coriaceum.
Ligustrum Japonicum.
Ligustrum laurifolium.
Ligustrum lucidum.
Ligustrum Nepalense.
Ligustrum ovalifolium.
Ligustrum prunifolium.
Ligustrum pyramidalis.
Ligustrum Sinense.
Ligustrum vulgare.
Ligustrum vulgare flore leuteum.
Ligustrum vulgare leucocarpum.
Ligustrum vulgare superbum.
Ligustrum vulgare variegatum.
Olea Americana.
Fontanesia phillyræoides.
Forsythia Fortuneii.
Forsythia suspensa.
Forsythia viridissima.
Syringa Emodi.
Syringa Josikœa.
Syringa Persica.
Syringa Persica alba.
Syringa Persica laciniata.
Syringa rothmagensis.
Syringa vulgaris.
Syringa vulgaris alba.
Syringa vulgaris cœrulea.
Syringa vulgaris Charles X.
Syringa vulgaris coccinea.
Springa vulgaris Columbiana.

B.—DICOTYLEDONÆ—Continued.

Syringa vulgaris Constantinopolitana.
Syringa vulgaris Croix de Broby.
Syringa vulgaris Dr. Lindley.
Syringa vulgaris Duchesse de Nemours.
Syringa vulgaris gigantea.
Syringa vulgaris Glory of Mt. Hope.
Syringa vulgaris grandiflora.
Syringa vulgaris insignis.
Syringa vulgaris Louis Bonaparte.
Syringa vulgaris Noissetiana.
Syringa vulgaris Philemon.
Syringa vulgaris Prince Nottger.
Syringa vulgaris Princesse Maria.
Syringa vulgaris purpurea.
Syringa vulgaris rosea.
Syringa vulgaris rosea grandiflora.
Syringa vulgaris rubra.
Syringa vulgaris semi-plena.
Syringa vulgaris Siberica.
Syringa vulgaris Sinensis alba.
Syringa vulgaris speciosa.
Syringa vulgaris spectabilis.
Syringa vulgaris Triomphe d'Orleans.
Syringa vulgaris variegata.
Syringa vulgaris violacea.
Syringa vulgaris virginalis.
Fraxinus amaerissima.
Fraxinus Americana.
Fraxinus Americana lucida.
Fraxinus Americana lyrata.
Fraxinus Americana Richardii.
Fraxinus Boscii.
Fraxinus Calabrica.
Fraxinus Chinensis.
Fraxinus Eloriza Japonica.
Fraxinus excelsior.
Fraxinus excelsior aenbæfolia.
Fraxinus excelsior argentea.
Fraxinus excelsior aurea.
Fraxinus excelsior aurea pendula.
Fraxinus excelsior crispa.
Fraxinus excelsior fungosa.
Fraxinus excelsior glomerata.
Fraxinus excelsior montrosa.
Fraxinus excelsior nana globosa.
Fraxinus excelsior nigra.
Fraxinus excelsior pendula.
Fraxinus excelsior Salicifolia.
Fraxinus excelsior Salicifolia variegata.
Fraxinus excelsior variegata.
Fraxinus excelsior verticillaris.
Fraxinus heterophylla.
Fraxinus hispida.
Fraxinus lentiscifolia.
Fraxinus oxycarpa.
Fraxinus pannosa.
Fraxinus platycarpa.
Fraxinus pubescens.
Fraxinus punctata.
Fraxinus quadrangulata.
Fraxinus rufa.
Fraxinus Sambucifolia.
Fraxinus Scolopendrifolia.
Fraxinus spectabilis.
Fraxinus Theophrasti.
Fraxinus viridis.
Ornus Europaea.
Ornus rotundifolia.
Forestiera acuminata.
Forestiera ligustrina.

III.—APETALÆ.

POLYGONACEÆ.

Brunnichia cirrhosa.

LAURACEÆ.

Benzoin melissæfolium.
Benzoin odoriferum.
Laurus nobilis.
Persea Carolinensis.
Persea Carolinensis palustris.
Sassafras officinale.
Tetranthera geniculata.

ARISTOLOCHIACEÆ.

Aristolochia Sipho.
Aristolochia tomentosa.

THYMELEACEÆ.

Daphne alpina.
Daphne Aucklandii.
Daphne Cneorum.
Daphne Cneorum foliis variegata.
Daphne Fortuneii.
Daphne Houtteana.
Daphne Japonica.
Daphne Laureola.
Daphne mezereum.
Daphne mezereum alba.
Daphne mezereum atropurpureum.
Daphne mezereum autumnale.
Daphne mezereum nova.
Dirca palustris.

ELÆAGNACEÆ.

Elæagnus angustifolia.
Elæagnus argentea.

B.—DICOTYLEDONÆ—Continued.

Elæagnus Hortensis.
Elæagnus parvifolia.
Elæagnus reflexa.
Elæagnus reflexa varigata.
Hippophæ salicifolia.
Hippophæ rhamnoides.
Hippophæ rhamnoides angustifolia.
Shepherdia argentea.
Shepherdia Canadensis.

SANTALACEÆ.

Buckleya distichophylla.
Darbya umbellulata.
Pyrularia oleifera.

EUPHORBIACEÆ.

Buxus Balearica.
Buxus Chinensis.
Buxus Fortuneii.
Buxus Japonica aurea.
Buxus longifolia.
Buxus rotundifolia.
Buxus sempervirens.
Buxus sempervirens aborescens.
Buxus sempervirens angustifolia.
Buxus sempervirens intermedia.
Buxus sempervirens marginata aurea.
Buxus sempervirens nana.
Buxus sempervirens pendula.
Buxus sempervirens rosmarinifolia.
Buxus sempervirens tenuifolia.
Buxus sempervirens variegata argentea.
Buxus thymifolia.
Stillingia ligustrina.

EMPETRACEÆ.

Ceratiola ericoides.
Corema Conradii.
Empetrum nigrum.

URTICACEÆ.

Celtis australis.
Celtis Caucasica.
Celtis glabrata.
Celtis Mississippiensis.
Celtis occidentalis.
Celtis occidentalis crassifolia.
Celtis occidentalis pumila.
Planera acuminata.
Planera aquatica.
Planera Richardii.
Ulmus alata.
Ulmus Americana.
Ulmus Americana aspera.
Ulmus Americana pendula.
Ulmus campestris.
Ulmus campestris argentea.
Ulmus campestris betulæfolia.
Ulmus campestris Cornubiensis.
Ulmus campestris foliis variegata.
Ulmus campestris incisa.
Ulmus campestris monumentalis.
Ulmus campestris myrtifolia.
Ulmus campestris nodosa.
Ulmus campestris parvifolia.
Ulmus campestris pendula.
Ulmus campestris plicata.
Ulmus campestris pyramidalis.
Ulmus campestris stricta purpurea.
Ulmus campestris tortuosa.
Ulmus campestris viminalis.
Ulmus cinerea.
Ulmus effusa.
Ulmus Floridana.
Ulmus fulva.
Ulmus glabra.
Ulmus glabra glomerata.
Ulmus glabra Seampstoniana.
Ulmus glabra pendula.
Ulmus glabra vegata.
Ulmus glabra vegata variegata.
Ulmus glabra vicosa.
Ulmus Kackii.
Ulmus Lantana.
Ulmus major.
Ulmus montana.
Ulmus montana asplenifolia.
Ulmus montana crispa.
Ulmus montana erecta.
Ulmus montana fastigiata.
Ulmus montana latifolia.
Ulmus montana pendula.
Ulmus montana pumila.
Ulmus montana purpurea.
Ulmus montana rugosa Mastersi.
Ulmus montana scabra.
Ulmus montana variegata.
Ulmus plumosa.
Ulmus racemosa.
Ulmus serratifolia.
Ulmus suberosa.
Ulmus suberosa erecta.
Ulmus suberosa vulgaris.
Ulmus superba.
Ulmus urticæfolia.
Broussonettia papyrifera.
Broussonettia papyrifera variegata.
Ficus Carica.

B.—DICOTYLEDONÆ—Continued.

Maclura aurantiaca.
Maclura aurantiaca variegata.
Maclura tricuspidata.
Morus alba.
Morus alba Morettiana.
Morus alba multicaulis.
Morus alba pumila.
Morus Constantinopolitana.
Morus Kaempferii.
Morus nigra.
Morus rubra.

PLATANACEÆ.

Platanus Nepalensis.
Platanus occidentalis.
Platanus orientalis.
Platanus orientalis acerifolia.
Platanus orientalis cuneata.

JUGLANDACEÆ.

Carya alba.
Carya amara.
Carya ambigua.
Carya aquatica.
Carya glabra.
Carya microcarpa.
Carya Myristicaeformis.
Carya sulcata.
Carya tomentosa.
Carya tomentosa maxima.
Juglans cinerea.
Juglans cinerea praeparturiensis.
Juglans mandchurica.
Juglans monophylla.
Juglans nigra.
Juglans regia.
Juglans regia pendula.
Juglans regia laciniata.
Juglans rupestris.
Pterocarya Caucasica.
Pterocarya lævigata.
Pterocarya sinensis.

CUPULIFERÆ.

Castanea Chinensis.
Castanea chrysophylla.
Castanea pumila.
Castanea vesca.
Castanea vesca asplenifolia.
Castanea vesca aurea nova.
Castanea vesca cochleata.
Castanea vesca crispa variegata.
Castanea vesca Downtoniana.
Castanea vesca glabra.
Castanea vesca macula.
Castanea vesca Madairensis.
Castanea vesca prolifica.
Castanea vesca pyramidalis.
Castanea vesca variegata.
Carpinus Americana.
Carpinus betulus.
Carpinus betulus incisa.
Carpinus betulus pendula.
Carpinus betulus variegata argentea.
Carpinus betulus variegata aurea.
Corylus Americana.
Corylus Avellana.
Corylus Avellana heterophylla.
Corylus Avellana purpurea.
Corylus Colurna.
Corylus rostrata.
Fagus betuloides.
Fagus ferruginea.
Fagus ferruginea Caroliniana.
Fagus sylvatica.
Fagus sylvatica cristata.
Fagus sylvatica cuprea.
Fagus sylvatica grandidentata.
Fagus sylvatica heterophylla.
Fagus sylvatica macrophylla.
Fagus sylvatica monstrosa.
Fagus sylvatica Norvegica.
Fagus sylvatica pendula.
Fagus sylvatica purpurea.
Fagus sylvatica quercifolia.
Fagus sylvatica variegata argentea.
Fagus sylvatica variegata aurea.
Ostrya alba.
Ostrya Virginica.
Ostrya vulgaris.
Quercus Ægilops.
Quercus Ægilops pendula.
Quercus agrifolia.
Quercus alba.
Quercus aquatica.
Quercus australis.
Quercus bambusaefolia.
Quercus Castanea.
Quercus Catesbaei.
Quercus Cerris.
Quercus Cerris Austriaca.
Quercus Cerris Fulhamensis.
Quercus Cerris heterophylla.
Quercus Cerris laciniata.
Quercus Cerris Lucombeana.
Quercus Cerris Lucombeana incisa.
Quercus Cerris Lucombeana variegata argentea.

B.—DICOTYLEDONÆ—Continued.

Quercus Cerris variegata.
Quercus cinerea.
Quercus cinerea pumila.
Quercus coccifera.
Quercus coccinea.
Quercus concordia.
Quercus conferta.
Quercus Damio.
Quercus densifolia.
Quercus Esculus.
Quercus falcata.
Quercus falcata pagodæfolia.
Quercus flagina.
Quercus Georgiana.
Quercus glabra.
Quercus Gramuntia.
Quercus heterophylla.
Quercus Hindsii.
Quercus Ilex.
Quercus Ilex ballota.
Quercus Ilex dentata.
Quercus Ilex Fordii.
Quercus Ilex integrifolia.
Quercus Ilex latifolia.
Quercus Ilex longifolia.
Quercus Ilex rotundifolia.
Quercus Ilex serratifolia.
Quercus Ilex Shepherdii.
Quercus ilicifolia.
Quercus imbricaria.
Quercus Japonica.
Quercus Libani.
Quercus Leana.
Quercus Lonettii.
Quercus lyrata.
Quercus macrocarpa.
Quercus macrocarpa olivæformis.
Quercus Mirbeckii.
Quercus nigra.
Quercus obtusiloba.
Quercus obtusiloba parvifolia.
Quercus palustris.
Quercus Pannonica.
Quercus pedunculata pterifolia.
Quercus pedunculata variegata bicolor.
Quercus pedunculata variegata maculata.
Quercus pedunculata variegata marginata.
Quercus Phellos.
Quercus Phellos arenaria.
Quercus Phellos laurifolia.
Quercus prinoides.
Quercus Prinus.
Quercus Prinus discolor.
Quercus Prinus Michauxii.
Quercus Prinus monticola.
Quercus Pyrenaica.
Quercus Robur.
Quercus Robur. pedunculata.
Quercus Robur. pedunculata asplenifolia.
Quercus Robur. pedunculata fastigiata cochleata.
Quercus Robur. pedunculata fastigiata.
Quercus Robur. pedunculata heterophylla.
Quercus Robur. pedunculata imbricata.
Quercus Robur. pedunculata pendula.
Quercus Robur. pedunculata purpurea.
Quercus Robur. pedunculata rubra.
Quercus Robur. pedunculata viride.
Quercus Robur. sessiliflora.
Quercus rubra.
Quercus rubra taraxicifolia.
Quercus tinctoria.
Quercus tridentata.
Quercus Turnerii.
Quercus virens.
Quercus virens dentata.
Quercus virens maritima.

MYRICACEÆ.

Comptonia asplenifolia.
Myrica asplenifolia.
Myrica Californica.
Myrica cerifera.
Myrica cerifera media.
Myrica cerifera pumila.
Myrica Gale.

BETULACEÆ.

Alnus barbata.
Alnus cordifolia.
Alnus glutinosa.
Alnus glutinosa asplenifolia.
Alnus glutinosa aurea.
Alnus glutinosa Imperalis laciniata
Alnus glutinosa laciniata.
Alnus glutinosa oxyacanthæfolia.
Alnus glutinosa quercifolia.
Alnus glutinosa sorbifolia.
Alnus incana.
Alnus incana glauca.
Alnus maritima.
Alnus oblongata.
Alnus pyrifolia.
Alnus serrulata.
Alnus viridis.
Betula alba.
Betula alba foliis purpurea.

B.—DICOTYLEDONÆ—Continued.

Betula alba laciniata pendula.
Betula alba pendula.
Betula alba populifolia.
Betula alba populifolia incisa.
Betula alba pubescens.
Betula alba urticifolia.
Betula Indiana.
Betula lenta.
Betula lutea.
Betula nana.
Betula nigra.
Betula n. sp.
Betula papyracea.
Betula pumila.
Betula rubra.

SALICACEÆ.

Populus alba.
Populus alba acerifolia.
Populus angulata.
Populus balsamifera.
Populus balsamifera candicans.
Populus balsamifera suaveolens.
Populus canescens.
Populus dilatata.
Populus græca.
Populus grandidentata.
Populus grandidentata pendula.
Populus heterophylla.
Populus laurifolia.
Populus monolifera.
Populus monolifera Lindleyana.
Populus tremula.
Populus tremula pendula.
Populus tremula variegata.
Populus tremuloides.
Salix acuminata.
Salix acutifolia.
Salix alaternoides.
Salix alba.
Salix alba cœrulea.
Salix alba pendula.
Salix alba vitellina.
Salix alba vitellina aurantiaca.
Salix ambigua.
Salix Ammaniana.
Salix amygdalina.
Salix Andersoniana.
Salix argentea.
Salix atrovirens.
Salix angustata.
Salix Ansoniana.
Salix aurita.
Salix Babylonica.
Salix Babylonica annularis.
Salix bicolor.
Salix Borreriana.
Salix cæsia.
Salix canescens.
Salix candida.
Salix caprea.
Salix caprea pendula.
Salix caprea tricolor.
Salix cinerea.
Salix conformis.
Salix cotinœfolia.
Salix cordata.
Salix cordata myricoides.
Salix cordata rigida.
Salix crassifolia.
Salix damascena.
Salix daphnoides.
Salix Dicksoniana.
Salix discolor.
Salix Doniana.
Salix dura.
Salix eriantha.
Salix eriocephala.
Salix fagifolia.
Salix ferruginea.
Salix Finmarchica.
Salix firma.
Salix Floridana.
Salix Forbesiana.
Salix Forbyana.
Salix Forsteriana.
Salix fragilis.
Salix fragilis decipiens.
Salix fragilis Russelliana.
Salix Grisonensis.
Salix hastata.
Salix Helvetica.
Salix Helix.
Salix herbacea.
Salix heterophylla.
Salix hippophæfolia.
Salix hirta.
Salix Hoffmanniana.
Salix holosericea.
Salix humilis.
Salix incana.
Salix Japonica.
Salix lacustris.
Salix lanata.
Salix lancifolia.
Salix latifolia.
Salix laurina.
Silax linearis.

B.—DICOTYLEDONÆ—Continued.

Salix longifolia.
Salix lucida.
Salix Meyeriana.
Salix microdentata.
Salix mollissima.
Salix Monspeliensis.
Salix moschata.
Salix nervosa.
Salix nigra.
Salix nigra falcata.
Salix nigricans.
Salix nitens.
Salix obtuserrata.
Salix pallescens.
Salix pallida.
Salix pedicellaris.
Salix pentandra.
Salix petiolaris.
Salix petræ.
Salix phylicifolia.
Salix pannosa.
Salix platens.
Salix Pomeranica.
Salix Pontederana.
Salix pratensis.
Salix procumbens.
Salix prunifolia.
Salix purpurea.
Salix purpurea pendula
Salix pyrifolia.
Salix ramifusca.
Salix regalis.
Salix recurvata.
Salix repens.
Salix reticulata.
Salix rivularis.
Salix rosmarinifolia.
Salix rostrata.
Salix rotundata.
Salix rubra.
Salix rugosa.
Salix rupestris.
Salix Salamoni.
Salix Schleicheriana.
Salix septentrionalis.
Salix sericea.
Salix spathulata.
Salix strepida.
Salix tenuifolia.
Salix tetrapla.
Salix triandra.
Salix tristis.
Salix ulmifolia.
Salix undulata.
Salix Uva-Ursi.
Salix Valesia.
Salix variegata.
Salix Vaudensis.
Salix violacea pendula.
Salix viminalis pendula.
Salix virescens.
Salix Weigeliana.

GYMNOSPERMÆ.

CONIFERÆ.

Pinus Austriaca.
Pinus Austriaca variegata.
Pinus Banksiana.
Pinus Brutia.
Pinus contorta.
Pinus densiflora.
Pinus glabra.
Pinus Halepensis.
Pinus Halepensis Pityusa.
Pinus inops.
Pinus Laricio.
Pinus Laricio Calabrica.
Pinus Laricio caramanica.
Pinus Laricio contorta.
Pinus Laricio pygmæa.
Pinus Massoniana.
Pinus Merkusii.
Pinus mitis.
Pinus Mugho.
Pinus Mugho nana.
Pinus Mugho rostrata.
Pinus Mugho rotundata.
Pinus Mugho uliginosa.
Pinus muricata.
Pinus Pallasiana.
Pinus Persica.
Pinus Pinaster.
Pinus Pinaster folius variegata.
Pinus Pinaster Hamiltonii.
Pinus Pinaster Lemoinana.
Pinus Pinaster minor.
Pinus Pinea.
Pinus Pinea Cretica.
Pinus Pinea fragilis.
Pinus pumilis.
Pinus pungens.
Pinus Pyrenaica.
Pinus resinosa.

B.—DICOTYLEDONÆ—Continued.

Pinus sylvestris.
Pinus sylvestris Altaica.
Pinus sylvestris argentea.
Pinus sylvestris aurea.
Pinus sylvestris globosa.
Pinus sylvestris Haguensis.
Pinus sylvestris horizontalis.
Pinus sylvestris intermedia.
Pinus sylvestris latifolia.
Pinus sylvestris monophylla.
Pinus sylvestris nana.
Pinus sylvestris tortuosa.
Pinus sylvestris uncinata.
Pinus Buonapartea.
Pinus cornea.
Pinus Lawsoni.
Pinus protuberans.
Pinus Regeliana.
Pinus albicaulis.
Pinus Apulcensis.
Pinus aristata.
Pinus Ayachuite.
Pinus Balfouriana.
Pinus Cembra.
Pinus Cembra pygmæa.
Pinus Cembra Siberica.
Pinus Devoniana.
Pinus excelsa.
Pinus excelsa rigida.
Pinus flexilis.
Pinus filifolia.
Pinus Frieseana.
Pinus Gordoniana.
Pinus Grenvilleæ.
Pinus Hartwegii.
Pinus Koriana.
Pinus Lambertiana.
Pinus leiophylla.
Pinus Lindleyana.
Pinus lophosperma.
Pinus Loudoniana.
Pinus macrophylla.
Pinus Montezumæ.
Pinus monticola.
Pinus occidentalis.
Pinus oocarpa.
Pinus oocarpa oocarpoides.
Pinus Orizabæ.
Pinus parvifolia.
Pinus Peuce.
Pinus Pseudo-Strobus.
Pinus Russeliana.
Pinus Strobiformis.
Pinus Strobus.
Pinus Strobus alba.
Pinus Strobus nana.
Pinus tenuifolia.
Pinus Torreyana.
Pinus Wincesteriana.
Pinus australis.
Pinus australis excelsa.
Pinus Bungeana.
Pinus Canariensis.
Pinus Chihuahuana.
Pinus Coulteri.
Pinus edulis.
Pinus Fremontiana.
Pinus Gerardiana.
Pinus insignis.
Pinus insularis.
Pinus Jeffreyii.
Pinus longifolia.
Pinus Llaveana.
Pinus macrocarpa.
Pinus Parryana.
Pinus patula.
Pinus patula macrocarpa.
Pinus patula stricta.
Pinus ponderosa.
Pinus Pinceana.
Pinus radiata.
Pinus rigida.
Pinus rigida serotina.
Pinus Sabiniana.
Pinus Sinensis.
Pinus Tæda.
Pinus Teocote.
Pinus tuberculata.
Abies alba.
Abies alba glauca.
Abies alba minima.
Abies alba nana.
Abies Alcocquiana.
Abies Engelmanni.
Abies excelsa.
Abies excelsa Carpatica.
Abies excelsa Clanbrasiliana.
Abies excelsa conica.
Abies excelsa denudata.
Abies excelsa diffusa.
Abies excelsa Donetti.
Abies excelsa elegans.
Abies excelsa crinita.
Abies excelsa Findonensis.
Abies excelsa Gregoryana.
Abies excelsa inverta.
Abies excelsa montrosa.
Abies excelsa mucronata.

B.—DICOTYLEDONÆ—Continued.

Abies excelsa nigra.
Abies excelsa pendula.
Abies excelsa pyramidalis.
Abies excelsa pygmæa.
Abies excelsa pygmæa glauca.
Abies excelsa stricta.
Abies excelsa tenuifolia.
Abies excelsa variegata.
Abies firma.
Abies Jezœnsis.
Abies Menziesii.
Abies microsperma.
Abies nigra.
Abies nigra pumila.
Abies nigra rubra.
Abies obovata.
Abies orientalis.
Abies Pattoniana.
Abies polita.
Abies Smithiana.
Abies Albertiana.
Abies Brunoniana.
Abies Canadensis.
Abies Canadensis inverta.
Abies Canadensis microphylla.
Abies Canadensis nana.
Abies Canadensis pendula.
Abies Douglasii fastigiata.
Abies Douglasii Standishiana.
Abies Douglasii taxifolia.
Abies Hookeriana.
Abies Mertensiana.
Abies Tsuga.
Abies Tsuganana.
Abies Apollinis.
Abies balsamea.
Abies balsamea longifolia.
Abies balsamea variegata.
Abies bracteata.
Abies Cephalonica.
Abies Fraseri.
Abies Fraseri Hudsonica.
Abies nobilis.
Abies nobilis glauca.
Abies Nordmanniana.
Abies pectinata.
Abies pectinata fastigiata.
Abies pectinata nana.
Abies pectinata pendula.
Abies pectinata pyramidalis.
Abies pectinata tortuosa.
Abies pectinata variegata.
Abies religiosa.
Abies amabilis.
Abies Cilicica.
Abies concolor.
Abies Fortuni.
Abies glaucescens.
Abies grandis.
Abies grandis lasiocarpa.
Abies grandis Lowiana.
Abies grandis Parsoniana.
Abies Fichta.
Abies Pichta longifolia.
Abies Pindrow.
Abies Pinsapo.
Abies Pinsapo variegata.
Abies Veitchii.
Abies Webbiana.
Cedrus Atlantica.
Cedrus Déodara.
Cedrus Deodara crassifolia.
Cedrus Deodara robusta.
Cedrus Deodara viridis.
Cedrus Libani.
Cedrus Libani argenteis.
Cedrus Libani pendula.
Cedrus Libani nana.
Cunninghamia Sinensis.
Cunninghamia Sinensis glauca.
Sciadopitys verticillata.
Sequoia gigantea.
Sequoia sempervirens.
Larix Americana.
Larix Dahurica.
Larix Europea.
Larix Europea compacta.
Larix Europea flore alba.
Larix Europea flore rubra.
Larix Europea Killermanni.
Larix Europea laxa.
Larix Europea pendua.
Larix Europea repens.
Larix Griffithiana.
Larix Japonica.
Larix Ledebourii.
Larix leptolepis.
Larix Lyalli.
Larix occidentalis.
Pseudolarix Kaempferi.
Araucaria Bidwillii.
Araucaria Brasiliana.
Araucaria Brasiliana gracilis.
Araucaria Brasiliana Ridolfiana.
Araucaria imbricata.
Araucaria Cunninghami.
Araucaria Cunninghami glauca.
Araucaria Cunninghami longifolia.

B.—DICOTYLEDONÆ—Continued.

Araucaria Rulei.
Arthrotaxis cupressoides.
Arthrotaxis taxifolia
Arthrotaxis selaginoides.
Juniperus communis.
Juniperus communis alpina.
Juniperus communis compressa.
Juniperus communis drupacea.
Juniperus communis Suecica.
Juniperus communis Hibernica.
Juniperus hemisphærica.
Juniperus macrocarpa.
Juniperus oblonga.
Juniperus Oxycedrus.
Juniperus rigida.
Juniperus rufescens.
Juniperus densa.
Juniperus excelsa.
Juniperus excelsa variegata.
Juniperus prostrata.
Juniperus recurva.
Juniperus religiosa.
Juniperus Sabina.
Juniperus Sabina cupressifolia.
Juniperus Sabina tamariscifolia,
Juniperus Sabina tamariscifolia variegata.
Juniperus squamata.
Juniperus thurifera.
Juniperus Virginiana.
Juniperus Virginiana Barbadensis.
Juniperus Virginiana Caroliniana.
Juniperus Virginiana dumosa.
Juniperus Virginiana glauca.
Juniperus Virginiana pendula.
Juniperus Virginiana pendula viridis.
Juniperus Virginiana variegata alba.
Juniperus Virginiana variegata aurea.
Juniperus Bermudiana.
Juniperus cæsia.
Juniperus Cedro.
Juniperus Cerrosianus.
Juniperus Chinensis.
Juniperus Chinensis aurea.
Juniperus flaccida.
Juniperus gigantea.
Juniperus Japonica.
Juniperus Mexicana.
Juniperus occidentalis.
Juniperus Phœnicia.
Juniperus procera.
Juniperus sphoerica.
Juniperus sphoerica glauca.
Juniperus taxifolia.
Juniperus tetragona,
Juniperus tripartita.
Widdringtonia Commersonii.
Widdringtonia cupressoides.
Widdringtonia Juniperoides.
Widdringtonia Natalensis.
Widdringtonia Wallichiana.
Libocedrus Chilensis.
Libocedrus decurrens.
Libocedrus Doniana.
Libocedrus tetragona.
Laechhardtia Macleyana.
Fitzroya Patagonica.
Thuja dumosa.
Thuja gigantea.
Thuja occidentalis.
Thuja occidentalis argentea.
Thuja occidentalis Brincherhoffi.
Thuja occidentalis Caucasica.
Thuja occidentalis Cheltoniensis.
Thuja occidentalis cristata.
Thuja occidentalis densa.
Thuja occidentalis Docii.
Thuja occidentalis ericoides.
Thuja occidentalis excelsa.
Thuja occidentalis glauca.
Thuja occidentalis globosa.
Thuja occidentalis Hackeri.
Thuja occidentalis Hoveyi.
Thuja occidentalis minima.
Thuja occidentalis nana.
Thuja occidentalis pendula.
Thuja occidentalis pumila.
Thuja occidentalis plicata.
Thuja occidentalis plicata variegata.
Thuja occidentalis Reedii.
Thuja occidentalis rotundata.
Thuja occidentalis Siberica.
Thuja occidentalis Tom Thumb.
Thuja occidentalis variegata.
Thuja occidentalis Vervaineana.
Thuja occidentalis recurva.
Thuja Standishii.
Thuiopsis dolabrata.
Thuiopsis dolabrata nana.
Thuiopsis dolabrata variegata.
Thuiopsis lætevirens.
Thuiopsis Standishii.
Biota orientalis.
Biota orientalis argentea.
Biota orientalis aurea.
Biota orientalis elegantissima.
Biota orientalis falcata.
Biota orientalis flagelliformis.

B.—DICOTYLEDONÆ—Continued.

Biota orientalis gluca.
Biota orientalis gracilis.
Biota orientalis hybrida.
Biota orientalis intermedia.
Biota orientalis macrocarpa.
Biota orientalis Meldensis.
Biota orientalis montrosa.
Biota orientalis pendula.
Biota orientalis pyramidalis.
Biota orientalis pygmæa.
Biota orientalis semper aurea.
Biota orientalis Sieboldii.
Biota orientalis Tartarica.
Biota orientalis variegata aurea.
Biota orientalis Zuccariniana.
Cupressus attenuata.
Cupressus aromatica.
Cupressus Benthamii.
Cupressus Corneyana.
Cupressus excelsa.
Cupressus funebris.
Cupressus fragrans.
Cupressus Goveniana.
Cupressus Knightiana
Cupressus Lawsoniana.
Cupressus Lawsoniana argentea.
Cupressus Lawsoniana aurea.
Cupressus Lawsoniana compacta.
Cupressus Lawsoniana erecta viridis.
Cupressus Lawsoniana laxa.
Cupressus Lawsoniana nivea.
Cupressus Lawsoniana stricta.
Cupressus Lusitanica.
Cupressus Mac-Nabiana.
Cupressus macrocarpa.
Cupressus Nutkaensis.
Cupressus Nutkaensis variegata.
Cupressus sempervirens.
Cupressus sempervirens cerciformis.
Cupressus sempervirens horizontalis.
Cupressus sempervirens monstrosa.
Cupressus sempervirens variegata.
Cupressus thurifera.
Cupressus thyoides.
Cupressus thyoides atrovirens.
Cupressus thyoides Kewensis.
Cupressus thyoides nana.
Cupressus thyoides variegata.
Cupressus torulosa.
Cupressus torulosa majestica.
Cupressus torulosa nana.
Cupressus torulosa viridis.
Cupressus Uhdeana.
Cupressus Whittleyana.
Retinospora cristata.
Retinospora filiformis.
Retinospora Hoggi pendula.
Retinospora leptoclada.
Retinospora lycopodiodes.
Retinospora obtusa.
Retinospora obtusa argentea.
Retinospora obtusa aurea.
Retinospora obtusa aureagracilis.
Retinospora obtusa elegans.
Retinospora obtusa ericoides.
Retinospora obtusa pygmæa.
Retinospora pisifera.
Retinospora pisifera argentea.
Retinospora pisifera aurea.
Retinospora pisifera nana variegata.
Retinospora plumosa.
Retinospora plumosa aurea.
Retinopsora squarrosa.
Retinospora squarrosa variegata.
Cryptomeria Japonica.
Cryptomeria Japonica araucarioides.
Cryptomeria Japonica Lobbii.
Cryptomeria Japonica nana.
Cryptomeria Japonica pendula.
Taxodium distichum.
Taxodium distichum denudatum.
Taxodium distichum fastigiatum.
Taxodium distichum Mexicanum.
Taxodium distichum nanum.
Glyptostrobus heterophyllus.
Glyptostrobus pendulus.
Taxus adpressa.
Taxus baccata.
Taxus baccata Canadensis.
Taxus baccata Cheshuntensis.
Taxus baccata Dovastoni.
Taxus baccata empetrifolia.
Taxus baccata erecta.
Taxus baccata ericoides.
Taxus baccata excelsa.
Taxus baccata fastigiata.
Taxus baccata fastigiata variegata.
Taxus baccata fructu-lutea.
Taxus baccata glauca.
Taxus baccata gracilis.
Taxus baccata Hibernica.
Taxus baccata horizontalis.
Taxus baccata Jacksonii.
Taxus baccata linearis.
Taxus baccata Nidpathensis.
Taxus baccata nana.
Taxus baccata nigra.
Taxus baccata recurvata.

B.—DICOTYLEDONÆ—Continued.

Taxus baccata sparsifolia.
Taxus baccata variegata aurea.
Taxus baccata variegata alba.
Taxus brevifolia.
Taxus cuspidata.
Taxus Floridana.
Taxus globosa.
Taxus Wallichiana.
Torreya Californica.
Torreya grandis.
Torreya nucifera.
Torreya taxifolia.
Cephalotaxus drupacea.
Cephalotaxus Fortunii.
Cephalotaxus pedunculata.
Cephalotaxus umbraculifera.
Podocarpus Alpina.
Podocarpus amara.
Podocarpus Andina.
Podocarpus Antarctica.
Podocarpus Bidwilli.
Podocarpus bracteata.
Podocarpus bracteata brevipes.
Podocarpus Chiliana.
Podocarpus Chinenis.
Podocarpus Chinensis argentea.
Podocarpus Chinensis aurea.
Podocarpus coriacea.
Podocarpus corrugata.
Podocarpus cupressina.
Podocarpus dacryoides.
Podocarpus discolor.
Podocarpus elata.
Podocarpus elongata.
Podocarpus Endlicherianus.
Podocarpus ensifolia.
Podocarpus falcata.
Podocarpus ferruginea.
Podocarpus Japonica.
Podocarpus Koraiana.
Podocarpus lœta.
Podocarpus Lambertii.
Podocarpus Lawrencii.
Podocarpus leptostachya.
Podocarpus macrophylla.
Podocarpus neglecta.
Podocarpus nerifolia.
Podocarpus nivalis.
Podocarpus nubigœna.
Podocarpus oleifolia.
Podocarpus polystachya.
Podocarpus Purdieana.
Podocarpus rigida.
Podocarpus Rumphii.
Podocarpus salicifolia.
Podocarpus Sellowii.
Podocarpus spicata.
Podocarpus spinulosa.
Podocarpus taxifolia.
Podocarpus taxifolia densifolia.
Podocarpus thevetiæfolia.
Podocarpus Thunbergii.
Podocarpus Totara.
Dacridium Colensoi.
Dacridium cupressinum.
Dacridium Cupressiforme.
Dacridium elatum.
Dacridium Franklinii.
Dacridium laxifolium.
Salisburia adiantifolia.
Salisburia adiantifolia dissecta.
Salisburia adiantifolia macrophylla.
Salisburia adiantifolia variegata.
Saxe-Gothæa conspicua.
Nageia Blumei.
Nageia cuspidata.
Nageia grandiflora.
Nageia Japonica.
Nageia Japonica variegata.
Nageia latifolia.
Nageia ovata.
Nageia ovata variegata.
Veitchia Japonica.

MONOCOTYLEDONÆ.

SMILACEÆ

Smilax aristata.
Smilax aristata variegata.
Smilax aspera.
Smilax aspera mauritanica.
Smilax auriculata.
Smilax glabra.
Smilax glauca.
Smilax hispida.
Smilax lanceolata.
Smilax laurifolia.
Smilax Pseudo-China.
Smilax rotundifolia.
Smilax rotundifolia quadrangularis.
Smilax tamnoides.
Smilax Walteri.

LILIACEÆ.

Ruscus aculeatus.
Ruscus aculeatus rotundifolius.
Ruscus hypoglossum.
Ruscus racemosus.
Yucca angustifolia.
Yucca filamentosa.
Yucca filamentosa pendulus.
Yucca filamentosa variegata.
Yucca filifera.
Yucca gloriosa.
Yucca quadricolor.
Yucca recurvifolia.
Yucca recurvifolia flaccida.
Yucca recurvifolia flaccida stricta.
Yucca superba.

DIVISION OF STATISTICS.

DIVISION OF STATISTICS.

This division was established in 1863, in the year following that of the organization of the Department, by the creation of the office of statistician and the appropriation of $20,000 for the purposes of statistical investigation and compilation. The position was filled by the appointment of a statistician, who was charged with the collection of crop-reports and current general statistics, and with the editing of the monthly report, a publication designed to include the gist of current crop-returns and such other data as required prompt publicity.

In 1866 the annual report was transferred to this division, and its editor was appointed statistician, and has since discharged the increased duties of this consolidation, establishing the division of statistics and publication, which now combines with the crop-reporting system and general investigation the revision and issue of the reports and publications.

The agricultural report of the Patent Office, which was published a few years prior to 1847 in connection with the annual mechanical report, became at that date a separate publication, which was continued as an annual until the organization of the Department of Agriculture, the last issued being that of 1861, under the auspices of the agricultural division of the Patent Office. The annual edition had been increased from a few thousand to 200,000. The new (or Department) series has had still larger issues, varying from 200,000 to 275,000 copies per annum, until the repeal of the franking privilege interfered with their distribution. The recent reports have not been published promptly on account of the differing views of the Senate and House relative to their distribution, the House usually voting to order 200,000 to 300,000 copies for free delivery, and the Senate desiring to limit franking, and inclining to the English plan of sale at cost of printing; but in August of the present year provision was made for the publication of 200,000 copies of 1875 and 100,000 copies of 1874.

It is susceptible of abundant proof that these volumes have greatly stimulated agricultural thought, encouraged the adoption of advanced processes, and excited a taste for agricultural reading, especially in new and poor settlements, in which they have proved a pioneer in all that pertains to agricultural progress. They have even gone in advance of the issues of the agricultural press, and created a demand for rural literature. They are more sought, according to the constant testimony of Congressmen, than any other public document, and are carefully husbanded and distributed by members with farming constituencies, while members representing cities now very generally make exchanges further to accommodate the constituents of the rural districts.

The function of the division of statistics is the collection of the current facts of agriculture in the United States and the compilation of such foreign statistics as may serve, by comparison and suggestion, to advance the interests of rural economy in this country. It involves an organization of a corps of reporters, consisting of a chief and three assistants in each county, charged with the duty of responding monthly to systematic inquiries concerning the condition of the growing crops, the area planted, rate of ultimate yield, the prevailing home prices of products, the condition and comparative numbers of farm animals, and other points of general interest. Circulars upon special subjects of local importance are occasionally sent; and special information from individual reporters is often sought, generally with prompt and satisfactory results.

These reporters are selected for their known intelligence and judgment, and the aid of agricultural societies, or, in their absence, of the Representative in Congress, is invoked in their selection, if suitable persons are not known to the officers of the Department. They are selected with reference to *fitness*, and their political views are usually unknown. Their duties are performed gratuitously, in a spirit of self-sacrifice for the public good, and with an ardent desire to co-operate with the Department for general as well as local progress in agriculture. They are undoubtedly more efficient than a force of mere stipendiaries, and are entitled to grateful recognition of their valuable services. It is a subject of regret that the Department has been unable to supply its statistical corps promptly with the annual reports which they help to make and on which many of their comparisons are based.

The translation and utilization of foreign statistical matter, and the preparation of original statistics for foreign exchange, are important features of the regular work of this division. The official statistics of States, of boards of trade, of railroads, of industrial associations, and all attainable data tending to illustrate production, distribution, and manufacture, are made available, so far as clerical facilities permit.

The furnishing of statistical statements for committees and members of Congress, boards of trade, and agricultural editors and authors, increases materially the work of the division. Added to these duties, the investigations required for original and practical papers for the monthly, annual, and special reports, the revision of matter prepared for publication, the preparation of illustrations, &c., demand service for which a singularly meager appropriation is quite inadequate, though other divisions of the Department are laid under contribution for such clerical aid as can properly be spared. The smallest State appropriation in aid of agricultural investigation is rarely less than the largest provision made for agricultural statistics of this Department for thirty-eight States and ten Territories. That results of comparative importance are obtained can be only due to the remarkable facilities of the Department in its control of an intelligent and faithful body of statistical reporters, whose combined service, freely rendered, is tenfold greater than the clerical and other service paid from appropriations.

More than nine-tenths of all this service is gratuitous. None of the ordinary work of the correspondent, who is often a farmer with a national reputation as a rural economist and man of broad views and general culture, is paid for; the work of the editor of the annual has been entirely unremunerated for ten years, and much of the matter for the several reports is furnished without cost. From $150,000 to $200,000 per annum is thus made a gratuity to the Government by ruralists of public spirit, who wish to advance the interests of producers and consumers, and save both classes from the jaws of the sharks that thrive on false statements concerning crop-production.

CENTENNIAL EXHIBITS.

The line of exposition adopted to illustrate the work of this division, at the International Centennial Exhibition, aims to present in compact form and logical arrangement, with such aids to interpretation as are offered by color and mathematical delineation, some of the main facts which illustrate the progress of settlement, production, and rural improvement in the United States. With a national census giving only the estimated production of the principal crops once in ten years, and very few of the States making any attempt in the direction of agricultural statistics, the field of prompt and general agricultural inquiry is left almost entirely to the statistical division of the Department of Agriculture. The rapid extension of cultivation in Western States and Territories and in the Pacific and Southwestern States, which causes changes in a single year that appear almost incredible, as for instance the increase of corn production in Kansas from 16,000,000 of bushels in 1874 to 80,000,000 in 1875, renders the work of this division exceedingly active and difficult. To gather the immense array of fragmentary data, and present for the Centennial a rounded and complete result in as many essential points as possible, much special statistical work was necessary, which has been reduced to a minimum by the extremely limited appropriation available for the service. The line of effort adopted includes, first, a series of large outline maps, illustrating the geographical distribution of crops and various results of original investigation; a series of charts and diagrams showing the important facts in production and distribution, industrial education and political economy; statistical record of the several great classes of agricultural facts, in plain text and with map, diagram and pictorial illustrations, designed to present briefly more succinct summary than has ever been presented to the public, and more complete in the classes of facts selected for exposition.

MAPS.—The larger charts consist of sixteen sheets, mounted as a single outline map of the United States, in size 17 by 12 feet, six in number, as follows:

1. Showing in five classes, by degrees of tinting, the value of the farm-lands of the United States by groups of counties, the first class including all below $10 per acre; the second, those not less than $10, and not exceeding $20; the third, those not less than $20, and not exceeding $30; the fourth, $30, and not exceeding $40; the fifth, $40 and over.

2. Showing, by five degrees of color, the average monthly wages through the year of farm-labor (without board) in the several States, from records of an investigation made by the statistical division in 1875. The classes are as follows: Under $20: South Carolina, $12.84; North Carolina, $13.46: Alabama, $13.60; Georgia, $14.40: Virginia, $14.84; Tennessee, $15.20; Florida, $15.50: Mississippi, $16.40; Kentucky, $18.12; Louisiana, $18.40; Missouri, $19.40: Texas, $19.50. Under $25: Maryland, $20.02; Delaware, $20.33; Arkansas, $20.50; West Virginia, $20.75; New Mexico, $22.75; Kansas, $23.20; Nebraska, $24; Ohio, $24.05; Indiana, $24.20; Iowa, $24.35. Under $30: Illinois, $25.20; Maine, $25.40; Wisconsin, $25.50; Pennsylvania, $25.89; Minnesota, $26.16; New York, $27.14: Michigan, $28.22; Connecticut, $28.25; New Hampshire, $28.57; Vermont. $29.67. Under $35: Rhode Island, $30; New Jersey, $30.71; Massachusetts, $31.87; Dakota, $32.50. $35 and over: Washington. $35; Utah, $35.50; Oregon, $38.25; Colorado, $38.50; California, $44.50; Montana, $45; Wyoming, $47.50.

3. Showing by groups of counties, in five shades of color, the proportion of woodlands in the farm-areas reported in the last census. The first class includes all counties with less than 15 per cent. in forest, the other classes divided, respectively, by 30, 45, and 60 per cent.

4. Showing the distribution of the product of the sugar crops—cane, sorghum, maple, and beet—and indicating, by three shades of color, the relative amount of such production in groups of counties.

5. Showing the distribution of the production of the textile fibers—cotton, hemp, flax, and wool—and indicating the localities of greatest production by three shades of color in each. Counties producing less than 1,000 bales of cotton, 50 tons of hemp, 100,000 pounds of flax fiber, or 100,000 pounds of wool are not indicated.

6. Showing the area in fruits of all kinds, by tints of States in four degrees of density, and indicating the prominent fruit sections and kinds of fruits most grown in each. The first class includes all States in which the entire fruit area does not exceed 1 per centum of the improved land in farms; *i. e.*, all farm-lands exclusive of forest and waste areas, viz: Minnesota, Iowa, Nebraska, and the Territories; the second, Maine, New Hampshire, Vermont, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Wisconsin; third, New York, Pennsylvania, Texas, Arkansas, Tennessee, West Virginia,

Kentucky, Ohio, Indiana, Illinois, Kansas, California, Oregon; fourth, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Florida, Michigan, Missouri.

CHARTS.—The larger charts are as follows:

1. Showing the corn and wheat production of the country, with the exports, seed used, and home consumption for five years, constituting the first half of the present decade. It is 7 feet 6 inches in height and 4 feet 6 inches wide, with diagrams presenting these details of average production on a scale of three-fourths of a million bushels to the square inch. It is a lucid and striking showing, especially to foreigners unfamiliar with the immensity of our cereal productions and the comparatively small proportion of the whole sent abroad.

The accompanying diagram represents it on a reduced scale. This chart makes the average supply of corn, in excess of export, for each unit of population, almost exactly 24 bushels for this period; the average area in cultivation, 37,699,803 acres; and the yield per acre 26.3 bushels. The statement accompanying the chart represents corn production and distribution as follows:

Years.	Production.	Consumption.	Seed.	Export.	
				Corn as meal.	Corn.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1870	1,094,255,000	1,070,695,802	12,882,325	850,564	9,826,309
1871	991,898,000	944,807,278	11,363,712	1,235,360	34,491,650
1872	1,092,719,000	1,040,722,348	11,842,278	1,612,444	38,541,920
1873	932,274,000	883,222,450	13,065,716	1,551,228	31,434,606
1874	850,148,500	806,444,492	13,678,972	1,166,616	28,858,420
Total	4,961,294,500	4,745,892,370	62,833,003	6,416,212	146,152,915
Average	992,258,900	949,178,474	12,566,601	1,283,242	29,230,583

An importation of corn is a fact scarcely dreamed. A little crosses our northern boundary from the Dominion, averaging 68,864 bushels.

The average supply of wheat in excess of export is 5 bushels; area in cultivation (average for five years), 21,386,709; yield per acre, 12.2 bushels. The imports of wheat have averaged 1,502,541 bushels, of which about three-tenths have been exported. The wheat figures are as follows:

Years.	Production.	Consumption.	Seed.	Export.	
				Wheat.	Wheat as flour.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1870	235,884,700	151,821,703	28,488,886	34,304,906	18,269,205
1871	230,722,400	161,810,806	29,915,839	26,423,080	12,572,675
1872	249,997,100	166,694,847	31,287,538	39,204,285	12,810,430
1873	280,372,700	155,735,041	33,127,261	71,039,928	20,470,470
1874	308,102,700	197,849,555	37,450,540	53,047,175	19,755,430
Total	1,305,079,600	836,911,952	160,270,064	224,019,374	83,878,210
Average	261,015,920	167,382,390	32,054,013	44,803,875	16,775,042

2. Showing the proportion of improved lands to the farm-area of each State and Territory. This is given in classes as follows:

Under 30 per cent.: North Carolina, South Carolina, Georgia, Louisiana, Texas, Arkansas, Dakota, Colorado, New Mexico, Washington, Wyoming; 30 and under 40 per cent.: Florida, Alabama, Minnesota, Mississippi, Tennessee, West Virginia, Kansas, Nebraska, Idaho; 40 and under 50 per cent.: Maine, Virginia, Kentucky, Missouri, California, Oregon, Nevada; 50 and under 60 per cent.: Rhode Island, Indiana, Michigan, Wisconsin; over 60 per cent.: New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Ohio, Illinois, Iowa, Utah, Arizona, Montana.

This chart also indicates the extent of several crop-belts, by a delineation of the line of northern limit respectively of sea-island cotton, upland cotton sorghum, and winter-wheat. The line dividing spring wheat from winter is worthy of careful study, as it separates, tortuous as it appears, within one or two parts in a hundred, the entire production of fall and spring sown grain. The line runs from near Boston through Southeastern Massachusetts and Connecticut, curves round the Housatonic Hills, strikes the vicinity of Saratoga, and runs in a northwesterly direction to Lake Ontario; thence including all our territory east of Lake Michigan, traverses a small section of Southwestern Indiana, strikes nearly west through the northern line of Missouri, crosses the Missouri at Saint Joseph, and gradually curves southward in Kansas as higher elevation is reached. The general direction from ocean to lakes is northwest, from lakes to the Rocky Mountains west-southwest. The line of northern limit of sorghum, on the contrary, preserves with a degree of uniformity a northwestern course. The difference is, sorghum is a summer crop, and its cultivation follows the summer isothermal line; while winter wheat depends not only on winter and spring climates, but to some extent on the nature of the soil and methods of cultivation.

The sea-island-cotton line skirts the coast from Charleston to Galveston; and the upland line runs from Norfolk southwesterly, curving around the mountain spurs of upper Georgia, cutting the northeastern section of Alabama, and thence sharply northward to include the Tennessee Valley and Western Tennessee, and all but the hill region of Arkansas, and southwestwardly through a corner of the Indian Territory and Texas to the Rio Grande.

Accompanying this chart is an estimate of the extent of cultivation of the principal crops, as follows:

		Acres.
Area, in 1875, in cereal crops		87,000,000
Of which, in maize	44,800,000	
Of which, in wheat	26,400,000	
Area, in 1875, in hay crops		23,500,000
Area, in 1875, in cotton		10,750,000
Area, in 1875, in orchards, vines, and fruits		4,500,000
Area, in 1875, in tobacco		460,000
Total area in cultivation in 1875		133,000,000

The following statement of grand areas, in square miles, is also given:

	Square miles.
Area, including water-surface	4,000,000
Area of States and Territories	3,611,889
Area of the thirteen original States	341,756
Area of public-land States and Territories	2,867,185
Area of public land unsold in 1870	2,168,331
Area of farm-lands in 1869	637,026
Area of farm-lands improved	295,189
Area of farm-lands in forest	248,922

DIAGRAMS.—To aid in comparison of different numbers and quantities, a tangible measure is useful to all, and to the multitude absolutely necessary. The arts of coloring and mathematical drawing are both brought into requisition for illustration of these abstract ideas which represent things so practical and commonplace. Among the diagrams which form a part of the exhibit are the following:

1. *The product of corn per capita.*—This is based upon the census year 1869, to save the necessity of estimating anew both population as well as production, taking the census data for both. The figures on which the diagram is based are, for the several States:

States.	Population.	Corn.
		Bushels.
Alabama	996, 992	16, 977, 948
Arkansas	484, 471	13, 382, 145
California	560, 247	1, 221, 222
Connecticut	537, 454	1, 570, 364
Delaware	125, 015	3, 010, 390
Florida	187, 748	2. 225, 056
Georgia	1, 184, 109	17, 646, 459
Illinois	2, 539, 891	129, 921, 395
Indiana	1, 680, 637	51, 094, 538
Iowa	1, 194, 020	68, 935, 065
Kansas	364, 399	17, 025, 525
Kentucky	1, 321, 011	50, 091, 006
Louisiana	726, 915	7, 596, 628
Maine	626, 915	1, 089, 888
Maryland	780, 894	11, 701, 817
Massachusetts	1, 457, 351	1, 397, 807
Michigan	1, 184, 059	14, 086, 238
Minnesota	439, 706	4, 743, 117
Mississippi	827, 922	15, 637, 316
Missouri	1, 721, 295	66, 034, 075
Nebraska	122, 993	4, 736, 710
Nevada	42, 491	9, 660
New Hampshire	318, 300	1, 277, 768
New Jersey	906, 096	8, 745, 384
New York	4, 382, 759	16, 462, 825
North Carolina	1, 071, 361	18, 454, 215
Ohio	2, 665, 260	67, 501, 144
Oregon	90, 923	72, 138
Pennsylvania	3, 521, 951	34, 702, 006
Rhode Island	217, 353	311, 957
South Carolina	705, 606	7, 614, 207
Tennessee	1, 258, 520	41, 343, 614
Texas	818, 579	20, 554, 538
Vermont	330, 551	1, 699, 882
Virginia	1, 225, 163	17, 649, 304
West Virginia	442, 014	8, 197, 865
Wisconsin	1, 054, 670	15, 033, 998
Total	38, 115, 641	759, 826, 214

It will be remembered that this was a year of very deficient yield of corn. Illinois, which stands second in proportion to population, had less than two-thirds of a full crop. A diagram for 1875 would differ somewhat from this. Illinois and most of the States west of the Mississippi would nearly or quite double the present rate per head, and require several additional "stories" in the structure of the diagram.

2. *The product of wheat per capita* from the crop of 1869, which was a large one for that date, but not so large as the crop of 1874 and of 1875, the acreage being on the increase. It will be seen that none of the New England States, with the sole exception of Vermont, produces one bushel

per head; that New York and New Jersey grow about half of their wheat supply; and the Southern States, with the exception of Virginia, fail to produce five bushels for each inhabitant, though in ordinary years Tennessee and Kentucky have a surplus. The following table gives the crop of each State and the number of bushels to each inhabitant:

States.	Wheat.	No. of bushels to each inhabitant.	States.	Wheat.	No. of bushels to each inhabitant.
	Bushels.			*Bushels*	
Alabama	1,055,068	1.05	Missouri	14,315,926	8.31
Arkansas	741,736	1.53	Nebraska	2,125,086	17.29
California	16,676,702	29.76	Nevada	228,866	5.39
Connecticut	38,141	.07	New Hampshire	193,621	.60
Delaware	895,477	7.16	New Jersey	2,301,433	2.54
Florida			New York	12,178,472	2.77
Georgia	2,127,017	1.79	North Carolina	2,859,879	2.66
Illinois	30,128,405	11.86	Ohio	27,882,159	10.46
Indiana	27,747,222	16.51	Oregon	2,340,746	25.75
Iowa	29,435,692	24.65	Pennsylvania	19,672,877	5.58
Kansas	2,391,198	6.56	Rhode Island	784	.00.3
Kentucky	5,728,704	4.33	South Carolina	783,610	1.11
Louisiana	9,906	.01.3	Tennessee	6,188,916	4.91
Maine	278,793	.41	Texas	415,112	.50
Maryland	5,774,503	7.39	Vermont	454,703	1.37
Massachusetts	34,648	.02.3	Virginia	7,398,787	6.03
Michigan	16,205,773	13.73	West Virginia	2,483,543	5.61
Minnesota	18,866,073	42.90	Wisconsin	25,606,344	24.28
Mississippi	274,479	.33			

3. *Area of wheat*, with the proportion sowed and drilled, respectively. This diagram is based on results of investigation by the statistical division. It omits the New England States, which produce little wheat, nearly all of which is sown broadcast. The wheat area in New York is divided equally between the two methods.

In New Jersey, Pennsylvania, Delaware, and Maryland the drill greatly predominates. In the Southern States the area is small, particularly in the cotton States, and the drill is comparatively unknown. North of the Ohio River, in the winter-wheat States, the drill is very generally used, the proportion rising to 76 per cent. in Illinois.

In the spring-wheat region there are several reasons for prominence of broadcasting. One comes from a prevalent practice of sowing wheat on the irregular surface of a corn-field without plowing; another is found in the use of the combined cultivator and broadcast-seeder, which destroys many of the weeds that would otherwise be left between the drills. The gist of both of these reasons lies in the saving of labor by a compromise process, which is cheap though slovenly. The result of the investigation shows that 47 per cent. of the winter-wheat and 30 of the spring, or 37 of both, represent the proportion seeded by the drill. The improvement by drilling is made to average 10 per cent. The average quantity of seed used for seeding winter wheat is 1.35 bushels per acre; 1.24 for drilled; 1.44 for the sown. The details are as follows:

States.	Proportion sown.	Proportion drilled.	Increase of product by drilling.	Seed per acre.	
	Percentage.			Bushels in broadcasting.	Bushels in drilling.
New York	50	50	13	1.80	1.60
New Jersey	45	55	6	1.95	1.60
Pennsylvania	30	70	12	1.74	1.49
Delaware	26	74	10	1.75	1.50
Maryland	24	76	7	1.70	1.43
Virginia	62	38	12	1.44	1.21
North Carolina	97	3	......	1.07	.83
South Carolina	99	1	......	1.00	.70
Georgia	99	1	......	1.00	.90
Alabama	99	1	......	1.00	......
Mississippi	99	1	......	1.25	......
Texas	98	2	......	1.18	.90
Arkansas	100	......	......	1.10	......
Tennessee	96	4	10	1.20	1.10
West Virginia	58	42	12	1.53	1.33
Kentucky	92	8	10	1.36	1.11
Ohio	39	61	16	1.57	1.33
Michigan	49	51	9	1.62	1.40
Illinois	24	76	19	1.52	1.24
Indiana	49	51	15	1.48	1.21
Missouri	62	38	21	1.52	1.21
Kansas	55	45	16	1.49	1.23
Nebraska	51	49	17	1.56	1.25
California	98	2	......	1.33	......
Oregon	81	19	5	1.50	1.21

4. *Corn and wheat exports of fifty years*, 1825 *to* 1875.—The light space on the right of the diagram represents the volume of wheat, the darker shade the flour in its equivalent of bushels of wheat. On the left corn in bushels is shown, and the darker stripe gives the equivalent of the corn-meal exports. It will be seen that the first half of the period is credited with less than a fifth of the wheat exports; and that the aggregate of the last quarter of the period is equal to the total shipment of the preceding three-fourths. A striking feature of the diagram is the remarkable increase in the export of whole wheat. For many years scarcely an appreciable quantity, it increases slowly at first, rapidly after 1860, and at the close of 1875 it nearly equaled the aggregate of wheat exports in the form of flour.

Year.	Wheat.		Flour.		Total wheat and flour.	
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1830	125,547		22,259,700		23,385,247	
1835	614,145		26,209,820		26,823.965	
		739,692		49,469,520		50.209,212
	739,692		49,469,520		50,209.212	
1840	1,842,841		20,464,660		22,307,501	
		2,582.533		69,934,180		72,516,713
	2,582,533		69,934,180		72,516,713	
1845	2,946,861		31,373,485		34,320,346	
		5,520,394		102,307,665		106,837,059
	5,529,394		101,307,665		106,837,059	
1850	10,184,645		61,424.140		71.608.785	
		15,714,039		162,731,805		178,445,844
	15,714,039		102,731,805		178,445,844	
1855	16,446,955		65,747,590		82,194,545	
		32.160,994		228,479,395		260,640,389
	32,160,994		228.479,395		260,640,389	

Year.	Wheat.		Flour.		Total wheat and flour.	
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1855	32,160,994		228,479,395		260,640,389	
1860	38,808,573		78,891,340		117,690,918	
		70,969,567		307,370,735		378,340,302
	70,969,567		307,370,735		378,340,302	
1865	138,306,907		98,788,665		237,095,572	
		209,276,474		406,159,400		615,435,874
	209,276,474		406,159,400		615,435,874	
1870	81,808,364		57,273,925		139,082,289	
		291,084,838		463,433,325		754,518,163
	291,084,838		463,433,325		754,518,163	
1871	34,304,906		18,269,205		52,574,111	
		325,389,744		481,702,530		807,092,274
	325,389,744		481,702,530		807,092,274	
1872	26,423,080		12,572,675		38,995,755	
		351,812,824		494,275,205		846,088,029
	351,812,824		494,275,205		846,088,029	
1873	39,204,285		12,810,430		52,014,715	
		391,017,109		507,102,744		898,102,744
	391,017,109		507,085,635		898,102,744	
1874	71,039,928		20,470,470		91,510,398	
		462,057,037		527,556,105		989,613,142
	462,057,037		527,556,105		989,613,142	
1875	53,047,175		19,755,430		72,802,605	
		515,104,212		547,311,535		1,062,415,747
	515,104,212		547,311,535		1,062,415,747	

The value of wheat exports for each half decade is thus given in detail:

Year.	Wheat.		Flour.		Total value of wheat and flour.
	Value.	Value.	Value.	Value.	
1830	$112,754		$24,708,090		$24,820,844
1835	737,365		29,347,649		
		$850,119		$54,055,739	54,905,858
	850,119		54,055,739		
1840	1,817,067		27,231,952		
		2,667,186		81,287,691	83,954,877
	2,667,186		81,287,691		
1845	2,900,785		31,056,156		
		5,567,971		112,343,847	117,911,818
	5,567,971		112,343,847		
1850	12,801,093		69,375,741		
		18,369,664		181,719,588	200,088,652
	18,369,064		181,719,588		
1855	21,864,762		75,775,220		
		40,233,826		257,494,808	297,728,684
	40,233,826		257,494,808		
1860	53,343,918		104,368,446		
		93,577,744		361,863,254	455,440,988
	93,577,744		361,863,254		
1865	178,470,444		133,356,875		
		272,048,188		495,220,129	767,268,317
	272,048,188		495,220,129		
1870	117,527,424		92,071,717		
		389,575,612		587,291,846	976,867,458
	389,575,612		587,291,846		
1871	45,143,424		24,093,184		
		434,719,036		611,385,030	1,046,104,066
	434,719,036		611,385,030		
1872	38,915,060		17,955,684		
		473,634,096		629,340,714	1,102,974,810
	473,634,096		629,340,714		
1873	51,452,254		19,381,664		
		525,086,350		648,722,378	1,163,808,728
	525,086,350		648,722,378		
1874	101,421,459		29,258,094		
		626,507,809		677,980,472	1,304,488,281
	626,507,809		677,980,472		
1875	59,607,863		23,710,074		
		686,115,672		701,690,546	1,387,806,218
	686,115,672		701,690,546		

The corn and corn-meal exported are equivalent to the following aggregate of bushels of corn:

Year.	Corn.		Corn-meal.		Total.
	Bushels.	Bushels.	Bushels.	Bushels.	
1830	3, 530, 710		3, 133, 632		6, 664, 342
1835	2, 568, 946		3, 269 532		
		6, 099, 656		6, 403, 164	12, 502, 820
	6, 099, 656		6, 403, 164		
1840	1, 184, 973		3, 375, 720		
		7, 284, 629		9, 778, 884	17, 063, 513
	7, 284, 629		9, 778, 884		
1845	3, 474, 109		4, 530, 996		
		10, 758, 738		14, 309, 880	25, 068, 618
	10, 758, 738		14, 309, 880		
1850	43, 822, 153		9, 974, 800		
		54, 580. 891		24, 284, 680	78, 865, 571
	54, 580, 891		24, 284, 680		
1855	23, 905, 196		4, 485, 824		
		78, 486, 087		28, 770, 504	107, 256, 591
	78, 486, 087		28, 770, 504		
1860	27, 597, 896		5, 165, 368		
		106, 083, 983		33, 935, 872	140, 019, 855
	106, 083, 983		33, 935, 872		
1865	52, 612, 028		4, 706, 428		
		158, 696, 011		38, 642, 300	197, 338, 311
	158, 696, 011		38, 642, 300		
1870	47, 993, 276		5, 420, 096		
		206, 689, 287		44, 062, 396	250, 751, 683
	206, 689, 287		44, 062, 396		
1871	9, 826, 309		850, 564		
		216, 515, 596		44, 912, 960	261, 428, 556
	216, 515, 596		44, 912, 960		
1872	34, 491, 650		1, 235, 360		
		251, 007, 246		46, 148, 320	297, 155, 566
	251, 007, 246		46, 148, 320		
1873	38, 541, 930		1, 612, 444		
		289, 549, 176		47, 760, 764	337, 309, 940
	289, 549, 176		47, 760, 764		
1874	34, 431, 606		1, 551, 228		
		323, 983, 782		49, 311, 992	373, 295, 774
	323, 983, 782		49, 311, 992		
1875	28, 858, 420		1, 166, 616		
		352, 842, 202		50, 478, 608	403, 320, 810
	352, 842, 202		50, 478, 608		

The value of corn and corn-meal, represented in connection with wheat in the second figure of the diagram, is as follows for the several periods:

Year.			Corn-meal.		Total value of corn and corn-meal.	
	Value.	Value.	Value.	Value.		
1830	$2, 019, 926		$2, 404, 371		$4, 424, 297	
1835	1, 804, 711		2, 731, 077		4, 535, 788	
		$3, 824, 637		$5, 135, 448		$8, 960, 085
	3, 824, 637		5, 135, 448		8, 960, 085	
1840	873, 101		3, 471, 215		4, 344, 319	
		4, 697, 741		8, 606, 663		13, 304, 404
	4, 697, 741		8, 606, 663		13, 304, 404	
1845	1, 755, 602		3, 037, 021		4, 792, 623	
		6, 453, 343		11, 643, 684		18, 097, 027
	6, 453, 343		11, 643, 684		18, 097, 027	
1850	31, 277, 920		8, 984, 252		40, 262, 172	
		37, 731, 263		20, 627, 936		58, 359, 199
	37, 731, 263		20, 627, 936		58, 359, 199	
1855	17, 712, 699		4, 147, 318		21, 860, 017	
		55, 443, 962		24, 775, 254		80, 219, 216
	55, 443, 962		24, 775, 254		80, 219, 216	

Year.	Corn.		Corn-meal.		Total value of corn and corn-meal.	
	Value.	Value.	Value.	Value.		
1855	55,443,962		24,775,524		80,219,219	
1860	19,789,181		4,917,515		24,706,696	
		75,233,143		29,692,769		104,925,912
	75,233,143		20,692,769		104,925,912	
1865	34,903,365		5,323,270		40,226,635	
		110,136,508		35,016,039		145,152,547
	110,136,508		35,016,039		145,152,547	
1870	47,143,817		7,3 5,448		54,488,265	
		157,280,325		42,361,487		199,641,812
	157,280,325		42,361,487		199,641,812	
1871	7,458,907		951,830		8,410,827	
		164,739,322		43,313,317		208,052,639
	164,739,322		43,313,317		208,052,639	
1872	23,984,365		1,214,999		25,199,364	
		188,723,687		44,528,316		233,252,003
	188,723,687		44,528,316		233,252,003	
1873	23,794,694		1,474,827		25,269,521	
		212,518,381		46,003,143		258,521,524
	212,518,381		46,003,143		258,521,524	
1874	24,769,951		1,529,399		26,299,350	
		237,288,332		47,532,542		284,820,874
	237,288,332		47,532,542		284,820,874	
1875	24,456,937		1,290,533		25,747,470	
		261,745,269		48,823,075		310,568,344
	261,745,269		48,823,075		310,568,344	

5. *Sugar supply of twenty-five years*, with a comparison of quantities of native, and foreign. This diagram represents the annual production of Louisiana, together with the imports entering annually into consumption, by separate tints of color, on the scale of 200,000,000 pounds per inch. It shows that in 1850 half the requisite supplies were produced in Louisiana; now, from the vast increase in consumption, and decrease in production, less than one-tenth of our wants are supplied at home. The figures accompanying this diagram are as follows:

Years.	Louisiana.	Total.	Years.	Louisiana.	Total.
	Pounds.	*Pounds.*		*Pounds.*	*Pounds.*
1850	242,881,150	443,908,572	1864	7,668,290	611,284,468
1851	272,029,050	642,792,597	1865	17,250,000	594,330,143
1852	370,224,100	815,663,455	1866	47,150,000	1,012,799,904
1853	505,222,600	941,814,232	1867	43,294,050	870,526,017
1854	398,630,250	792,610,363	1868	96,891,400	1,195,120,413
1855	266,141,050	695,021,736	1869	100,153,500	1,309,847,125
1856	85,072,400	597,638,166	1870	166,613,150	1,306,202,065
1857	321,651,550	1,078,450,344	1871	147,730,150	1,327,456,300
1858	116,640,400	853,994,264	1872	124,798,000	1,565,760,616
1859	255,116,000	870,540,053	1873	102,922,700	1,525,704,971
1860	263,071,700	919,346,722	1874	134,504,691	1,705,193,954
1861	528,321,500	1,251,620,551			
1862		530,832,412	Total	4,913,980,591	23,060,395,437
1863		498,846,005			

6. *The cotton crop of ten years—effect of quantity upon value.*—This brings in juxtaposition the aggregate quantity and value of the crop for each year since 1865, one inch in length meaning a half million of bales or $50,000,000. It shows that when the quantity rose from 3,154,946 bales in 1869 to 4,352,317 bales in 1870, the price declined from 23.6 to 14.9 cents, so that the large crop brought $44,673,491 less than the medium crop preceding. The next year the crop declined to 2,974,351

bales, and the price rose to 19.3 cents. The high price of the first year was, of course, the result of the cotton famine of the war period.

7. *Average yield per acre*, 1866–1875.—The estimates of area and production furnish means of making averages for a period which are truer and more instructive than the fluctuating averages of separate years. Those averages are not necessarily indices of fertility of soil, as Massachusetts, utterly insignificant in corn production, stands far higher than Illinois. Fertilizers and special culture give larger results per acre than the richest soils. Illinois probably stands lower for this period of nine years than for any former period, having suffered for several seasons of drought and other unpropitious meteorological conditions. The average yields of corn and wheat are as follows:

2. WHEAT.

20.9 to 15.2 bushels:
- Nevada.
- Oregon.
- Massachusetts.
- Connecticut.
- Vermont.
- Rhode Island.
- Minnesota

14.8 to 14.0:
- New Hampshire.
- Kansas.
- New Jersey.
- New York.

13.7 to 13.0:
- California.
- Wisconsin.
- Michigan.
- Pennsylvania.
- Maine.
- Texas.

12.4 to 12.1:
- Nebraska.
- Iowa.
- Missouri.

11.8 to 11.4:
- Illinois.
- Ohio.

10.9 to 10.1:
- Indiana.
- Delaware.
- Maryland.
- Arkansas.
- West Virginia.

9.3 to 8.3:
- Kentucky.
- Mississippi.
- Louisiana.
- Florida.
- Virginia.

1. CORN.

38.2 to 35.2 bushels:
- California.
- New Jersey.
- Vermont.
- Ohio.
- New Hampshire.
- Pennsylvania.

34.7 to 32.1:
- Massachusetts.
- Iowa.
- Nebraska.
- Kansas.
- Minnesota.
- Indiana.

31.2 to 30.1:
- New York.
- Wisconsin.
- Connecticut.
- Nevada.
- Michigan.
- Missouri.

29.9 to 25.9:
- Oregon.
- Illinois.
- Maine.
- Kentucky.
- West Virginia.
- Rhode Island.
- Arkansas.

24.5 to 22.8:
- Maryland.
- Tennessee.
- Texas.

19.9 to 16.1:
- Virginia.
- Delaware.
- Louisiana.
- Mississippi.

2. WHEAT.

7.7 to 6.0:
- Tennessee.
- Alabama.
- North Carolina.
- Georgia.
- SouthCarolina.

1. CORN.

14.2 to 9.6:
- North Carolina.
- Alabama.
- Georgia.
- Florida.
- South Carolina.

8. *Aggregate value of principal crops,* being an average from 1866 to 1874, inclusive. This diagram is a line illustration on the scale of 100,000,000 to the square inch, which shows that corn leads all our crops, hay next (grass as pasturage not included), and wheat and cotton are almost exactly equal. These averages are as follows:

Corn	$549, 238, 907	Potatoes	$76, 356, 914
Hay	343, 111, 450	Tobacco	34, 439, 809
Wheat	308, 983, 272	Barley	23, 374, 788
Cotton	308, 590, 811	Rye	18, 695, 826
Oats	123, 867, 426	Buckwheat	12, 943, 912

9. *Aggregate product of corn, wheat, and potatoes—effect of quantity upon value.*—This diagram shows the course of production through eight years. The scale is arranged to illustrate quantities by lines representing one hundred, two hundred, up to thirteen hundred millions of bushels, and when used to illustrate value the same lines mean fifty, one hundred, up to six hundred and fifty millions of dollars. Tracing the line representing corn, starting at less than nine hundred million bushels, it falls one hundred millions in 1869, and at 1870 and 1872, respectively, it nearly reaches eleven hundred million. Then following the upper line, showing the value of corn, nearly six hundred millions of dollars in 1866—a rise in value attends a decline in quantity, and *vice versa*, the only exception being in 1871, when the surplus of the preceding year made the supply a very full one, while the great crop of 1872 struck with panic the corn markets, and completely demoralized prices. The prices of corn are controlled almost exclusively by the quantity produced, as the market cannot be "cornered," and the export of 3 per cent. is scarcely a disturbing element; in this instance, foreign demand does not fix the prevailing home price. With wheat it is different, as the lines show, in some years prices continuing to rise with a rise in quantity, caused by poor crops in Europe.

10. *Wages of farm labor—monthly rate without board,* 1866 *and* 1875.—This diagram shows the monthly rate of each State, in both the years named, from the exhaustive investigations of the Department. The scale of line-illustrations is $10 per inch. There is shown a decline in wages, except in some of the Southern States, where labor is becoming more efficient and valuable, and in Oregon, where a scarcity exists. The figures are as follows:

States.	1866.	1875.	States.	1866.	1875.
Maine	$27 00	$25 40	Louisiana	$20 50	$18 40
New Hampshire	32 74	28 57	Texas	19 00	19 50
Vermont	32 84	29 67	Arkansas	24 21	20 50
Massachusetts	38 94	31 87	Tennessee	19 00	15 20
Rhode Island	34 40	30 00	West Virginia	25 35	20 75
Connecticut	34 25	28 25	Kentucky	20 23	18 12
New York	29 57	27 11	Ohio	28 46	24 05
New Jersey	32 27	30 71	Michigan	31 26	28 22
Pennsylvania	29 91	25 89	Indiana	27 71	24 20
Delaware	24 93	20 33	Illinois	28 54	25 20
Maryland	20 36	20 02	Wisconsin	30 84	25 50
Virginia	14 82	14 84	Minnesota	31 65	26 16
North Carolina	13 46	13 46	Iowa	28 34	24 35
South Carolina	12 00	12 84	Missouri	26 75	19 40
Georgia	15 51	14 40	Kansas	31 03	23 20
Florida	18 00	15 50	Nebraska	38 37	24 00
Alabama	13 40	13 60	California	45 71	44 50
Mississippi	16 72	16 40	Oregon	35 75	38 25

11. *Immigration of seven years—comparison of its sources.*—In further illustration of labor interests, this diagram shows the sources of our supply from other countries. Great Britain furnishes 39 per cent. and Germany 34; all other nationalities little more than a fourth of the whole.

12. *Comparative area of the public-land States.*—This diagram illustrates the superficial area of each State by square figures drawn to a scale of 25,000,000 acres per square inch. The proportion surveyed in 1874 is indicated by shading, as also the area actually appropriated up to 1870.

States and Territories.	Area in acres.	Acres surveyed.	Acres appropriated.
California	120, 947, 840	38, 805, 776	20, 877, 662
Dakota Territory	96, 596. 128	13, 863, 913	5, 835, 604
Montana Territory	92, 016, 640	6, 784, 481	5, 179, 821
New Mexico Territory	77, 568, 610	5, 486, 185	6, 864, 082
Arizona Territory	72. 906, 240	3, 135, 753	4. 050. 350
Nevada	71, 737, 600	8, 198, 194	4. 669. 383
Colorado Territory	66, 880, 000	15, 683, 986	4, 303, 320
Wyoming Territory	62, 615, 068	4, 748, 841	3, 480, 281
Oregon	60, 975, 360	15, 255, 617	9. 515, 744
Idaho Territory	55, 228, 160	4, 014, 953	3. 102, 407
Utah Territory	54, 065, 042	5. 984, 792	5, 315, 086
Minnesota	53, 459, 840	35, 897, 912	19, 516. 340
Kansas	52, 043, 520	45. 770, 685	10, 544, 439
Nebraska	48, 636, 800	32, 372, 410	8, 869, 943
Washington Territory	44, 796, 160	10, 190. 046	3, 556. 967
Indian Territory	44, 154, 240	22, 832. 725	......
Missouri	41, 284. 000	41, 284, 000	40, 549, 368
Florida	37, 931, 520	29, 345. 870	20, 643, 611
Michigan	36, 128, 640	36, 128, 640	32, 468, 110
Illinois	35, 462, 400	35, 462. 400	35, 462. 400
Iowa	35, 228, 800	35, 228, 800	34, 036, 220
Wisconsin	34, 511, 360	34, 511, 360	26, 118, 729
Alabama	34, 462, 080	34, 462, 080	28, 522, 448
Arkansas	33, 406, 720	33, 406, 720	22, 463, 872
Mississippi	30, 179, 840	30, 179, 840	25, 531, 387
Louisiana	26, 461, 440	23, 909, 253	20, 033, 897
Ohio	25, 576, 960	25, 576, 960	25, 576, 960

13. *Aggregate value of farm animals—average from* 1846 *to* 1874, *inclusive.*—This diagram represents these values as follows: Cattle, $646,214,801; horses, $600,782,233; mules, $108,033,293; swine, $146,417,611; sheep, $94,491,942.

MINOR CHARTS.—Several charts embody the numbers and prices of farm animals, taken from the statistical estimates of 1876, which are as follows:

Table showing the estimated value and average price of horses, mules, and cows, and other cattle January, 1876.

States.	Horses.		Mules.		Milch cows.		Oxen and other cattle.	
	Value.	Average price.	Value.	Average price.	Value.	Average price.	Value.	Average price.
Maine	$6,463,954	$81 41	....	.. ...	$6,079,100	$37 00	$7,155,336	$35 44
New Hampshire	3,804,180	80 94	....	....	3,780,700	38 50	4,498,160	38 12
Vermont	6,201,380	83 24	....	. ....	7,060,150	33 70	3,827,565	29 33
Massachusetts	9,416,718	89 94	....	....	6,780,699	48 33	5,710,800	47 59
Rhode Island	1,438,689	97 87	....	.....	795,600	39 00	795,529	49 72
Connecticut	4,197,354	82 14	....	.....	4,805,297	43 33	4,185,188	36 68
New York	61,119,000	90 00	$1,819,475	$98 35	56,111,250	37 50	21,122,920	31 85
New Jersey	12,824,188	110 84	1,924,800	128 32	6,429,213	44 37	3,037,800	36 60
Pennsylvania	49,557,970	84 70	2,528,745	96 15	29,027,160	34 68	20,556,143	29 03
Delaware	1,635,620	83 45	380,000	95 00	736,000	32 00	783,624	24 72
Maryland	8,779,710	83 22	1,164,460	105 86	3,052,217	30 31	2,728,391	22 87
Virginia	13,551,397	69 53	2,550,880	85 60	5,168,790	22 77	6,701,850	16 89
North Carolina	10,473,309	74 97	4,267,318	82 54	3,111,480	15 48	3,191,508	10 19
South Carolina	5,040,202	88 58	1,204,929	94 07	3,140,175	19 75	2,182,523	11 69
Georgia	9,389,471	79 37	8,380,944	87 12	4,512,002	17 02	3,572,019	8 91
Florida	1,306,274	78 22	879,840	91 65	976,616	14 62	2,958,076	8 14
Alabama	7,449,984	71 36	8,132,280	80 20	3,109,414	20 27	4,186,167	12 79
Mississippi	6,775,164	76 04	9,328,427	97 07	3,671,838	21 03	3,639,135	11 85
Louisiana	4,484,914	58 78	6,708,404	83 96	1,855,616	20 71	2,007,792	11 68
Texas	25,554,168	33 17	5,932,413	53 59	7,861,572	15 72	22,429,209	9 57
Arkansas	8,594,901	54 09	5,629,500	67 50	2,606,580	16 20	2,775,006	10 62
Tennessee	19,919,520	62 64	6,919,858	67 82	4,701,331	20 83	3,945,903	12 19
West Virginia	6,651,336	59 44	163,392	68 08	3,234,135	25 77	5,087,376	21 63
Kentucky	20,766,018	56 94	5,009,050	58 93	6,836,918	27 94	8,236,144	21 14
Ohio	52,601,712	69 14	1,969,060	72 04	26,433,440	32 65	21,510,063	24 87
Michigan	24,437,839	82 31	365,256	96 12	12,169,070	33 70	10,803,500	26 35
Indiana	41,725,056	61 76	4,187,804	71 71	11,916,260	27 40	15,175,695	19 65
Illinois	65,229,075	59 75	7,929,207	71 37	20,852,090	29 05	27,721,980	21 54
Wisconsin	23,608,305	67 05	443,352	85 26	12,679,500	26 75	9,173,071	20 39
Minnesota	12,945,516	75 09	306,528	95 79	5,881,865	25 19	6,606,475	20 05
Iowa	43,774,614	63 83	3,041,770	82 21	16,726,420	26 90	19,095,012	20 91
Missouri	26,400,100	45 40	7,070,986	56 03	9,140,852	20 86	14,143,844	17 38
Kansas	11,280,899	49 63	1,333,080	64 40	5,609,232	23 76	9,213,490	18 95
Nebraska	4,713,618	69 42	450,800	98 00	1,676,973	28 09	1,864,044	20 76
California	9,514,778	45 46	1,497,680	77 20	11,445,148	31 46	21,586,000	20 08
Oregon	3,600,952	42 68	169,016	45 68	1,759,575	21 75	1,754,400	12 75
Nevada	588,600	54 00	85,800	78 00	326,700	33 00	980,700	21 00
The Territories	6,330,500	55 00	1,859,000	71 50	7,988,750	27 50	14,761,080	18 78
Total	632,446,985	.....	106,565,114	......	320,346,728	......	319,623,500	.....
Grand average of prices	....	64 96	....	75 33	....	28 89	....	19 04

Table showing the estimated number, average price, and value of sheep and swine January, 1876.

States.	Sheep.			Swine.		
	Number.	Average price.	Value.	Number.	Average price.	Value.
Maine	525,900	$3 78	$1,987,902	58,800	$11 66	$685,608
New Hampshire	242,400	2 70	654,480	37,300	16 20	604,260
Vermont	490,500	3 74	1,834,470	51,800	12 19	631,442
Massachusetts	76,300	3 63	276,969	75,600	18 03	1,363,068
Rhode Island	25,300	3 96	100,188	16,300	17 05	277,915
Connecticut	92,500	4 18	386,650	57,900	16 73	968,667
New York	1,936,500	3 95	7,649,175	568,700	11 39	6,477,493
New Jersey	125,800	5 01	630,258	153,000	13 83	2,115,990
Pennsylvania	1,640,500	3 58	5,872,990	875,000	11 50	10,062,500

Table showing the estimated number, average price, and value of sheep and swine—Cont'd.

States.	Sheep.			Swine.		
	Number.	Average price.	Value.	Number.	Average price.	Value.
Delaware	23, 600	3 67	86, 612	46, 700	10 61	495, 487
Maryland	141, 200	3 89	549, 268	233, 500	7 10	1, 657, 850
Virginia	356, 400	2 93	1, 044, 252	589, 800	4 45	2, 624, 610
North Carolina	283, 900	1 58	448, 562	758, 300	4 01	3, 040, 783
South Carolina	142, 700	1 81	258, 287	275, 900	4 11	1, 133, 949
Georgia	371, 200	1 73	642, 176	1, 360, 700	3 91	5, 320, 337
Florida	37, 800	1 94	73, 332	175, 400	2 26	396, 404
Alabama	185, 900	1 93	358, 787	755, 900	3 99	3, 016, 041
Mississippi	151, 800	1 81	274, 758	792, 900	4 31	3, 417, 399
Louisiana	68, 800	2 04	140, 352	222, 600	3 98	885, 948
Texas	1, 691, 400	2 00	3, 382, 800	1, 090, 000	4 00	4, 158, 100
Arkansas	192, 400	2 01	386, 724	901, 200	3 91	3, 523, 692
Tennessee	341, 700	2 11	720, 987	1, 026, 400	5 22	5, 357, 808
West Virginia	544, 500	2 55	1, 388, 475	248, 400	5 38	1, 336, 392
Kentucky	683, 600	2 85	1, 948, 260	1, 604, 300	5 51	8, 839, 693
Ohio	4, 546, 600	2 72	12, 366, 752	1, 596, 100	8 06	12, 864, 566
Michigan	3, 450, 600	2 65	9, 144, 090	459, 700	7 93	3, 645, 421
Indiana	1, 250, 000	2 62	3, 275, 000	2, 136, 000	7 70	16, 447, 200
Illinois	1, 311, 000	2 41	3, 159, 510	2, 640, 100	8 63	22, 784, 063
Wisconsin	1, 162, 800	2 74	3, 186, 072	540, 700	7 58	4, 098, 506
Minnesota	190, 200	2 63	500, 226	213, 400	6 99	1, 491, 666
Iowa	1, 663, 900	2 66	4, 425, 974	3, 296, 200	8 08	26, 633, 296
Missouri	1, 284, 200	1 86	2, 388, 612	1, 874, 300	5 94	11, 133, 342
Kansas	123, 900	2 80	346, 920	246, 500	8 91	2, 196, 315
Nebraska	48, 900	2 77	135, 453	80, 900	7 58	613, 222
California	6, 750, 000	2 02	13, 635, 000	363, 300	7 17	2, 604, 861
Oregon	710, 500	1 99	1, 413, 895	181, 500	4 41	800, 415
Nevada	20, 900	2 60	54, 340	5, 200	9 00	46, 800
The Territories	3, 049, 200	2 80	8, 537, 760	116, 500	8 75	1, 019, 375
Total	35, 935, 300		93, 666, 318	25, 726, 800		175, 070, 484
Grand average of prices		2 60			6 80	

The comparative value of horses and cows in the several States is thus presented:

2. COWS.

$50 to $40:
- **New Jersey.**
- **Massachusetts.**
- **Connecticut.**
- **Rhode Island.**

$40 to $35:
- **Nevada.**
- **California.**
- **Vermont.**
- **New York.**
- **Pennsylvania.**
- **New Hampshire.**
- **Maine.**

$35 to $30:
- **Michigan.**
- **Ohio.**
- **Delaware**
- **The Territories.**
- **Maryland.**
- **Nebraska.**
- **Illinois**

1. HORSES.

$130 to $100:
- **New Jersey.**
- **Massachusetts.**
- **Rhode Island.**
- **Connecticut.**
- **Florida.**

$100 to $90:
- **Pennsylvania.**
- **Georgia.**
- **South Carolina.**
- **New York.**
- **Vermont.**
- **Mississippi.**

$90 to $80:
- **Maryland.**
- **Louisiana.**
- **Maine.**
- **New Hampshire.**
- **North Carolina.**
- **Delaware.**
- **Alabama.**

Comparative value of horses and cows—Continued.

2. Cows.

$35 to $30:
- Indiana.
- Kentucky.
- West Virginia.

$30 to $25:
- Oregon.
- Wisconsin.
- Iowa.
- Minnesota.
- Kansas.
- Virginia.

$25 to $20:
- Missouri.
- Louisiana.
- South Carolina.
- Mississippi.
- Tennessee.
- Georgia.
- Alabama.

$20 to $10:
- Arkansas.
- North Carolina.
- Florida.
- Texas.

1. Horses.

$80 to $70:
- Michigan.
- Virginia.
- Ohio.
- Tennessee.
- Wisconsin.
- Minnesota.
- Arkansas.
- Nebraska.

$70 to $65:
- West Virginia.
- Indiana.
- Kentucky.
- Iowa.
- Illinois.

$65 to $50:
- Kansas.
- Missouri.
- The Territories.

$50 to $30:
- Nevada.
- Oregon.
- California.
- Texas.

In connection with these charts are type specimens (in lithograph, black and tint) of breeds of farm animals most popular and generally distributed. These are—

a. Shorthorn bull (Bates), Duke of Airdrie (12,730).
b. Shorthorn cow (Bates), Dutchess of Geneva.
c. Shorthorn bull (Booth), Breastplate (11,431).
d. Shorthorn grade steer.
e. Devon bull, Huron.
f. Jersey bull, King of Prairie.
g. Dutch cow, Infrau.
h. Ayrshire grade, "Old Creamer."

The second is the famous cow that brought, at auction, $40,600; the last, the cow that gave 100 pounds of milk daily for thirty days.

Another series of charts illustrates the statistics of agricultural education, accompanied by the following illustrations (wood engraving upon lithographic tint) of college buildings, as follows:

a. College of Agriculture and the Mechanic Arts at Hanover, N. H.
b. Institute of Technology at Boston, Mass.
c. Agricultural College at Amherst, Mass.
d. College of Agriculture (Cornell University), Ithaca, N. Y.
e. Agricultural and Mechanical College, Columbus, Ohio.
f. Industrial University at Urbana, Ill.

g. "Ashland," homestead of Henry Clay, regents' residence, Kentucky University, Lexington, Ky.

h. College of Agriculture at Berkeley, Cal.

i. Female College, University of Wisconsin, Milwaukee, Wis.

k. College of Agriculture, Lincoln, Nebr.

l. Industrial University, Fayetteville, Ark.

A portion of these statistics of our industrial system are given in the following tables:

States.	Number of acres donated by Congress.	Number of acres sold.	Number of professors and assistants in the agricultural and mechanical college.	Number of students in the agricultural and mechanical college.	Number of students in the university with which the college is connected.
Alabama	240,000	240,000	8	88	....
Arkansas	150,000	150,000	8	9	248
California	150,000	150,000	27	85	231
Connecticut	180,000	180,000	29	224	1,051
Delaware	90,000	90,000	8	42	....
Florida	90,000	90,000	....	....	....
Georgia	270,000	270,000	15	344	487
Illinois	480,000	454,560	24	131	374
Indiana	390,000	390,000	7	....	57
Iowa	240,000	63,025	17	277	....
Kansas	90,000	57,495	15	237	....
Kentucky	330,000	330,000	8	95	260
Louisiana	210,000	210,000	6	225	....
Maine	210,000	210,000	8	115	....
Maryland	210,000	210,000	5	52	....
Massachusetts	360,000	360,000	48	391	....
Michigan	240,000	75,584	14	156	....
Minnesota	120,000	64,997	10	9	237
Mississippi	210,000	210,000	11	5	222
Missouri	330,000	1,571	19	142	491
Nebraska	90,000	....	4	20	132
Nevada	90,000	....	14	29	479
New Hampshire	150,000	150,000	11	57	188
New Jersey	210,000	210,000	30	73	532
New York	990,000	580,800	5	7	70
North Carolina	270,000	270,000	11	100	....
Ohio	630,000	630,000	6	60	155
Oregon	90,000	700	12	148	....
Pennsylvania	780,000	780,000	13	40	255
Rhode Island	120,000	120,000	2	20	209
South Carolina	180,000	180,000	16	53	315
Tennessee	300,000	300,000	....	....	....
Texas	180,000	180,000	7	14	153
Vermont	150,000	150,000	26	423	....
Virginia	300,000	300,000	5	15	125
West Virginia	150,000	150,000	14	17	345
Wisconsin	240,000	187,597	....	....	....
Total	9,510,000	7,907,329	403	3,703	6,616

From the above statement it appears that 84 per cent. of the donated lands have been sold; and the following shows the property already invested in industrial education aggregates seventeen and a half millions:

States.	Acres in farms.	Value of farms.	Value of buildings.	Value of all college property.
Alabama	200	$2,000	$100,000	$327,500
Arkansas	160	12,000	5,000	300,000
California	200			1,087,500
Connecticut			225,000	614,000
Delaware	70	15,000	50,000	139,000
Florida				100,134
Georgia	70	2,500	200,000	346,000
Illinois	623	60,000	200,000	868,308
Indiana	184	60,000	25,000	510,000
Iowa	870	10,584	237,000	968,899
Kansas	415	3,000	31,000	458,782
Kentucky	433	130,000	120,000	311,000
Maine	370		65,000	258,620
Maryland	270	13,500	60,000	210,000
Massachusetts	383	37,500	163,500	1,460,627
Michigan	676	10,148	109,500	929,699
Minnesota	143	8,500	1,200	357,250
Mississippi	310	5,100	100,000	229,515
Missouri	600	60,000	75,000	
Nebraska	480			468,000
New Hampshire	163	15,005	50,000	240,000
New Jersey	99	30,000	75,000	292,200
New York	200	40,000	560,000	2,651,998
Ohio	320	112,000		904,000
Oregon	36	5,000	6,000	239,000
Pennsylvania	600	59,136	300,000	897,589
Rhode Island				56,000
South Carolina	116	9,000	35,000	200,800
Tennessee	260	30,000	53,000	397,190
Texas	800			291,240
Vermont				416,972
Virginia	369	39,740	89,000	491,448
West Virginia	25		80,000	155,000
Wisconsin	234		164,000	359,204
Total				17,535,475

To conclude the series of exhibits, the smaller diagrams, the charts in the show-frame illustrating the above-named branches of statistical exposition, together with further letter-press illustration of the real extent of our agricultural resources and present production, are gathered together in the form of a statistical album, for preservation of the substance of the exhibits, and as a fragmentary record of a century's progress and memorial of the great centennial anniversary.

J. R. DODGE,
Statistician.

CHEMICAL DIVISION.

CHEMICAL DIVISION.

CATALOGUE OF COLLECTION PREPARED BY THE CHEMICAL DIVISION OF THE DEPARTMENT OF AGRICULTURE FOR EXHIBITION IN THE INTERNATIONAL EXHIBITION OF 1876.

WILLIAM McMURTRIE, *Chemist in Chief.*

The collection prepared under the direction of the chemical division of the Department of Agriculture consists of soils and fertilizers and of materials intended to illustrate the utilization of those agricultural and horticultural products, the value of which depends upon their chemical changes to render them fit for consumption. Further than this, the collection contains a series of products illustrating the utilization of American dairy products.

In order to carry out this general idea the collection was made up in two grand divisions, viz:

A. Soils and fertilizers.

B. Vegetable products, the value of which depends upon their chemical composition, and the methods for the utilization of which involves chemical processes.

The first grand division consists of:

I.—Soils taken from different geological formations.

II.—Rocks of known composition, with samples of soils formed from them by disintegration and decomposition.

III.—Marls:

1. Calcareous or shell marl.
2. Phosphatic marl.
3. Green sand marl.

IV.—Natural fertilizers:

1. Mineral.
2. Vegetable.
3. Animal.

V.—The combination of natural fertilizing materials for production of the so-called commercial or artificial fertilizers.

The second grand division consists of:

1. Cereals and the products resulting from their utilization.
2. Materials illustrating the production of sugar.
3. Products illustrating the processes of fermentation of amylaceous and saccharine substances, and the production of alcoholic liquors from them by distillation.

4. Products illustrating the processes of preparing tobacco for consumption.
5. Tanning and dyeing materials.
6. Materials illustrating the utilization of wood by dry distillation.
7. Vegetable products prepared and preserved for food by special methods.
8. Products of the American materia medica, and the active proximate principles separated from them.

The dairy products are divided into—

1. Salt.
2. Annatto.
3. Cheese.
4. Butter.

On account of the limited time and means at the disposal of the division the groups represented are not entirely complete. The collection will, however, serve to illustrate the object and the work of the division, viz, the application of geology and chemistry to the study of agriculture and the utilization of agricultural and horticultural products.

A.—SOILS AND FERTILIZERS.

I.—SOILS FROM DIFFERENT GEOLOGICAL FORMATIONS.

The materials included in the first group of this grand division were prepared under the supervision of Prof. George H. Cook, State geologist of New Jersey. It was the intention of the Department to have had all the specimens presented analyzed, but the means at its disposal would not admit it. In order, therefore, to show the composition of soils from the different formations we present, in connection with averages of several analyses published by Professor Cook in the first annual report of the State Board of Agriculture of New Jersey. While the individual specimens exhibited may have a slightly different composition than is represented by the figures given, the variation with this regard will never be found very great.

I.—SOILS TAKEN FROM DIFFERENT GEOLOGICAL FORMATIONS.

1. Soils arranged with reference to the geological formation from which they were taken.

A.—Gneiss Soils.

1. Surface soil, from Hon. Aaron Robertson's farm, Schooley's Mountain, Morris County, New Jersey. This soil has never been cultivated or manured.

Average composition: SiO_2, 68.89; Al_2O_3, 11.55; FeO, 4.95; CaO, 1.11; MgO, 1.37; K_2O, 1.95; Na_2O, 0.41; HSO_4, 0.04; Cl, trace; P_2O_5, 0.18; H_2O, 1.64; organic matter, 6.86.

2. Subsoil, same.

3. Surface soil, from Martin J. Ryerson's farm, Bloomingdale, Passaic County, New Jersey.

4. Subsoil, same.

5. Surface soil, gneiss drift, from M. J. Ryerson's farm, Pompton Plains, N. J.

6. Subsoil, same.

B.—MAGNESIAN LIMESTONE SOILS.

7. Surface soil, from Thomas Shields's farm, Beatyestown, Warren County, New Jersey. This soil was a natural one, unchanged by cultivation or manure.

Average composition: SiO_2, 65.06; Al_2O_3, 14.75; FeO, 4.51; CaO, 0.67; MgO, 1.55: K_2O, 4.57; Na_2O, 0.53; HSO_4, 0.02; Cl, trace; P_2O_5, 0.16: H_2O, 1.45: organic matter, 5.52.

8. Subsoil, same.

C.—SLATE SOILS.

9. Surface soil, from Delaware Station, Warren County, New Jersey. Taken from a fence-corner on border of woods.

Average composition: SiO_2, 65.75; Al_2O_3, 14.37; FeO, 6.10; CaO, 0.56; MgO, 1.60; K_2O, 3.86; NaO, 0.10; HSO_4, 0.04; Cl, trace: P_2O_5, 0.17; H_2O, 1.68; organic matter, 5.12.

10. Subsoil, same.

D.—RED SANDSTONE SOILS.

11. Surface soil, from New Brunswick, New Jersey. This is a natural soil taken from the commons in the northwest part of the city.

Average composition: SiO_2, 65.80; Al_2O_3, 13.29; FeO, 5.05; CaO, 0.84; MgO, 1.21; K_2O, 1.74; NaO_2, 1.12: HSO_4, 0.09; Cl, trace; P_2O_5, 0.15; H_2O, 2.70; organic matter, 7.45.

12. Subsoil, same.

13. Surface soil, from New Jersey State Agricultural College farm, New Brunswick, N. J. From a fence-corner uncultivated for many years.

14. Subsoil, same.

E.—GREENSAND (MARL) SOILS.

15. Surface soil, from B. C. Fatem's farm, Woodbury, N. J. This ground had been broken up, but never had been manured.

Average composition: SiO_2, 79.30; Al_2O_3, 1.81; FeO, 1.71: CaO, 0.82; MgO, 0.23; K_2O, 0.77; Na_2O, 0.03: HSO_4, 0.12; Cl, 0.14; P_2O_5. 0.11; H_2O, 2.24; organic matter, 12.56.

16. Subsoil, same.

17. Surface soil from Azariah Conover's farm, Middletown, Monmouth County, New Jersey. This ground had never been plowed.

18. Subsoil, same.

19. Surface soil, from Rev. G. C. Schanck's farm, near Marlborough, Monmouth County, New Jersey. Natural soil.

20. Subsoil, same.

21. Surface soil, from John R. Perrine's farm, Manalapin, Monmouth County, New Jersey. This soil has been under cultivation for many years.

22. Subsoil, same.

23. Surface soil, from E. A. Osborn's farm, Middletown, Monmouth County, New Jersey.

24. Subsoil, same.

25. Surface soil, from Charles Hollingshead's farm, Medford, Burlington County, New Jersey. This soil was taken from a fence-corner of a field.

26. Subsoil, same.

27. Surface soil, from Lesley Peacock's farm, Medford, Burlington County, New Jersey. This soil was from woodland.

28. Subsoil, same.

29. Surface soil, from General H. Irick's farm, Vincentown, Burlington County, New Jersey. This soil was taken from a byroad on the farm.

30. Subsoil, same.

31. Surface soil, from Charles Stevenson's farm, Blackwoodstown, Camden County, New Jersey. This soil was taken from a corner of a cultivated field.

32. Subsoil, same.

33. Surface soil, from B. Tomlinson's farm, near Clementon, Camden County, New Jersey. This soil was taken from the side of the public road, and had not been cultivated for many years.

34. Subsoil, same.

F.—TERTIARY (EOCENE) SOILS.

Average composition: SiO_2, 84.80; Al_2O_3, 6.53; FeO, 1.92; CaO, 0.48; MgO, 0.40; K_2O, 0.81; Na_2O, 0.44; HSO_4, 0.08; Cl, 0.01; P_2O_5, 0.05; H_2O, 1.60; organic matter, 1.90.

35. Surface soil, from Atsion, Burlington County, New Jersey.

36. Subsoil, same.

37. Surface soil, from Spring Lake Beach (old Osborn farm), near Squan, Monmouth County, New Jersey.

38. Subsoil, same.

39. Surface soil, from Upper Alloway's Creek Township, Salem County, New Jersey. This soil was taken from white oak land that had never been cultivated.

40. Subsoil, same.

41. Surface soil, from G. Ayer's farm, near Jericho, Cumberland County, New Jersey. This soil was taken from brush land.

42. Subsoil, same.

G.—DRIFT SOILS.

Average composition: SiO_2, 94.62; Al_2O_3, 2.21; FeO, 0.60; CaO, 0.08; MgO, 0.12; K_2O, 0.13; Na_2O, 0.14; HSO_4, 0.04; Cl, trace; P_2O_5, 0.01; H_2O, 0.56; organic matter, 1.61.

43. Surface soil, from Richards's farm, Jackson, Camden County, New Jersey. This soil was taken from old fields not under cultivation at present.

44. Subsoil, same.

45. Surface soil, from H. A. Green's farm, Atco, Camden County, New Jersey. Taken from the most sandy soil in the neighborhood.

46. Subsoil, same.

47. Surface soil, from Whiting's Station, Ocean County. Taken from the poorest soil of this vicinity, and represents but a small area of the surrounding country.

48. Subsoil, same.

49. Surface soil, from Hon. A. K. Hay's farm, Winslow, Camden County, New Jersey. Taken from woodland.

50. Subsoil, same.

51. Surface soil, from Twelfth street and First road, Hamilton, Atlantic County, New Jersey. Taken from the poorest of the tract.

52. Subsoil, same.

53. Surface soil, from H. Bahibr's farm, Egg Harbor City, N. J. This is considered the best soil for grapevines.

54. Subsoil, same.

55. Surface soil, from H. Hobel's, Egg Harbor City, N. J. This is a lighter soil and very sandy.

56. Subsoil, same.

57. Surface soil, from Dr. T. T. Price's lands, Tuckerton, Burlington County, New Jersey. Taken from woodland.

58. Subsoil, same.

H.—POST TERTIARY SOILS.

Average composition: SiO_2, 85.41; Al_2O_3, 5.29; FeO, 1.36; CaO, 0.55; MgO, 0.37; K_2O, 0.80; NaO, 0.26; HSO_4, 0.03; Cl, trace; P_2O_5, 0.06; H_2O, 1.37; organic matter, 4.14.

59. Surface soil, from Port Elizabeth, Cumberland County, New Jersey. Taken from roadside. This represents the more sandy portion of this part of the State.

60. Subsoil, same.

61. Surface soil, from Captain Van Gilder's lands, 1 mile from Searlville Station. Taken from soil not under cultivation.

62. Subsoil, same.

63. Subsoil No. 2, same.

II.—KNOWN ROCKS AND SOILS FORMED FROM THEM.

The second group consists of known rocks and the soils formed from them by disintegration and decomposition. The series exhibited was prepared under the direction of Prof. E. L. Berthoud, Cañon City, Colo. It is, of course, by no means as complete as it was originally intended to make it, but it will serve to suggest to those having time and means to follow it out a profitable line of study, viz, the character and composition of the soils which may be produced from our known rocks. The specimens of soils were selected from positions where admixture from *debris* from breaking down of rocks other than those represented by the soils was impossible.

Feldspathic granite, Rocky Mountains.
Subsoil from metamorphia granite.
Mica schist from foot-hills, Rocky Mountains.
Surface soil from granite and mica schist.
Dolerite.
Decomposed dolerite.
Sandstone from Trias red bed.
A sandstone from Trias red bed.
Surface soil, Triassic red bed.
Subsoil, same.
Limestone from Cretaceous formations.
Surface soil, limestone, between Triassic and Cretaceous.
Subsoil, same
Surface soil, Cretaceous clay, with veins of bog ore with arenaceous rock.
Subsoil, same.
Cretaceous sandstone.
Surface soil over Cretaceous rock (sandstone).
Subsoil from decomposed Cretaceous rock.
Arenaceous shell marl, Cretaceous.
Surface soil from green clay beds, Eocene.
Subsoil, same.
Surface-soil from Miocene.
Subsoil, same.
Surface soil covering glacial drift.
Subsoil, same (auriferous).
Sandstone from lignite beds.
Surface soil from lignite beds, Tertiary.
Subsoil, same.
Alkali soil, Clear Creek alluvian lands.
Alkali soil, Clear Creek bottoms.
Tailings from mines, deposited by Clear Creek, 20 to 30 miles below the mines supposed to cake the soil and render it sterile from the hydrous oxide of iron, and the sulphates of iron and copper.
Tailings and quartz-sand after several years' exposure.

III.—MARLS.

This group may be divided into (1) Calcareous or shell marls; (2) Phosphatic marls; (3) Greensand marls.

Calcareous or shell marls.—This series was prepared by Prof. George H. Cook. The value of these marls depends almost entirely upon the quantity of carbonate of lime, in a friable condition, they contain. They are found quite extensively distributed through the more recent geological formations.

1. Shell marl, from O. C. Herbert's pits, Marlborough, N. J., PaO_5, 1.60; $HS.O_4$, —; SiO_2, 41.50; K_2O, —; Ca, 11.47; Co_3, —; MgO, 2.37; Al_2O_3, FeO, 30.12; H_2O, 9.91. Marl under shell layer, same.
2. Shell marl, from N. Lippincott's pits, Auburn, Salem County, New Jersey.
3. Shell marl, from Basset's pits, Marshallville, Salem County, New Jersey, SiO_2, 43.40; Ca CO_3, 44.45; MgO, 1.95; Al_2O_3, TeO, 6.20.
4. Shell marl, from West Jersey Marl Company, Barnsboro', Gloucester County, New Jersey.
5. Shell marl, from G. Ayar's pits, near Jericho, Cumberland County, New Jersey.

Phosphatic marls.—These marls are found in connection with the extensive phosphate beds near Charleston, S. C., and are valuable on account of the phosphate and carbonate of lime they contain. Before being applied to the soil, they are generally calcined. The specimens presented for exhibition were collected under the direction of Dr. C. U. Shepard, jr., of Charleston, S. C.

6. Marl, from Stone River, South Carolina.
7. Marl, from Coosaw River, South Carolina.

The following marls were taken from different positions in a bed nearly 60 feet in thickness, found near Woodstock, 16½ miles from Charleston, S. C.:

8. Marl, 3 feet from top of bed.
9. Marl, 9 feet from top of bed.
10. Marl, 13 feet from top of bed.
11. Marl, 18 feet from top of bed.
12. Marl, 23 feet from top of bed.
13. Marl, 28 feet from top of bed.
14. Marl, 32 feet from top of bed.
15. Marl, 36 feet from top of bed.
16. Marl, 47 feet from top of bed.
17. Marl, 55 feet from top of bed.
18. Marl, from end of gallery.
19. Calcined marl, from Woodstock Marl Works. It has the following composition:

	Per cent.
Phosphate of lime	13.25
Carbonate of lime	10.23
Lime	47.15
Silica	29.80

Greensand marls.—These marls have been used more largely in New Jersey than in any other section, and while the deposits there have been more extensively worked in that State than in any other section they are by no means confined to it, but are found in many of the other States of the Atlantic coast, and in the far West. Their value depends almost entirely upon the percentage of phosphoric acid and potassa they contain.

The deposits are divided into lower, middle, and upper beds; those from the middle beds being considered the most valuable and most generally selected for fertilizing purposes.

The marls exhibited and their analyses were furnished by Prof. George H. Cook.

20. Blue marl, from J. G. Smock's pits, near Holmdel, Monmouth County, New Jersey.

21. Red or highbank marl, from J. G. Smock's pits, near Holmdel, Monmouth County, New Jersey.

22. Grey marl, from J. G. Smock's pits, near Holmdel, Monmouth County, New Jersey.

23. Blue marl, from Rev. G. C. Schanck's pits, near Marlborough, Monmouth County, New Jersey: P_2O_5, 2.08; H_2, SO_4, —; SiO_2, 56.30; CO_2, —; K_2O, 4.92; CaO, —; Mgo, 1.70; Al_2O_3, 8.20; FeO, 17.38; H_2O, 8.05.

24. Blue marl, from J. R. Perrine's pits, Manalapan, Monmouth County, New Jersey: P_2O_5, 2.37; SiO_2, 47.10; CaO, 2.52; MgO, 2.44; Al_2O_3, FeO, 32.93; H_2O, 8.90.

25. Green marl, from Ballin's Mills, Gloucester County, New Jersey.

26. Green marl, from Cream Ridge Marl Company, Upper Freehold, Monmouth County, New Jersey: P_2O_5, 1.34; H_3SO_4, —; SiO_2, 46.82; CO_2, —; K_2O, 5.59; CaO, 2.02; MgO, 3.10; Al_2O_3, 6.48; FeO, 23.93; H_2O, 9.70.

27. Green marl, from Pemberton Marl Company, Birmingham, Burlington County, New Jersey: P_2O_5, 1.28; H_2SO_4, 1.37; SiO_2, 51.92; CO_2, —; K_2O, 5.36; CaO, 1.68; MgO, 3.38; Al_2O_3, 5.40; FeO, 19.82; H_2O, 8.70.

28. Chocolate marl, from Pemberton Marl Company, Birmingham, Burlington County, New Jersey.

29. Green marl, from Fostertown and South Branch Marl and Transportation County, Burlington County, New Jersey.

30. Limesand, from General H. Irick's pits, Vincentown, Burlington County, New Jersey.

31. Limesand, from Hanies's mill, near Medford, Burlington County, New Jersey.

32. Green marl, from Burlington pits, near Lumberton, Burlington County, New Jersey.

33. Green marl, from M. Roger's pits, Kirkwood, Camden County, New Jersey: P_2O_5, 2.24; H_2SO_4, 0.39; SiO_2, 50.80; K_2O, 5.18; CaO, 2.13; MgO, 3.59; FeO, 18.83; Al_2O_3, 8.77; H_2O, 8.46.

34. Green marl, from D. Marshall's pits, Blackwoodtown, Camden County, New Jersey: P_2O_5, 3.66; H_2SO_4, 0.62; SiO_2, 49.94; K_2O, 6.31; CaO, 2.37; MgO, 2.71; FeO, Al_2O_3, 24.54; H_2O, 9.43.

35. Green marl, from Thomas Heritage's pits, Hurfoille, Gloucester County, New Jersey: P_2O_5, 2.50; SiO_2, 47.30; CaO, 2.97; MgO, 2.69; Al_2O_3 FeO, 29.91; H_2O, 8.96.

36. Green marl, from West Jersey Marl Company, Barnsboro', Gloucester County, New Jersey: P_2O_5, 1.60; H_2SO_4, —; SiO_2, 51.10; CO_2, —; K_2O, 6.46; CaO, 2.13; MgO, 3.85; Al_2O_3, 9.15; FeO, 18.20; H_2O, 6.75.

37. Green marl, from N. T. Stratton's pits, Mullica Hill, Gloucester County, New Jersey.

38. Green marl, from Dickinson & Bro.'s, Woodstown, Salem County, New Jersey: P_2O_5, 1.47; H_2SO_4, —; SiO_2, 50.85; CO_2 —; K_2O, 5.33; CaO, 1.65; MgO, 2.95; Al_2O_3, 6.89; FeO, 21.34; H_2O, 8.40.

39. Green marl, from Squankum and Freehold Marl Company, Farmingdale, Monmouth County, New Jersey: P_2O_5, 4.67; H_2SO_4, 0.51; SiO_2, 52.70; CO_2, 0.00; K_2O, 3.81; CaO, 5.52; MgO, 2.70; Al_2O_3, 8.66; FeO, 15.92; H_2O, 6.40.

40. Ash marl, from Squankum and Freehold Marl Company, Farmingdale, N. J.: P_2O_5, 3.17; H_2SO_4, 0.57; SiO_2, 59.05; Co_2, —; K_2O, 4.72; CaO, 4.65; MgO, 2.66; Al_2O_3, 6.67; FeO, 11.27; H_2O, 7.50.

41. Green marl, from Vincentown Marl Company, Vincentown, Burlington County, New Jersey: P_2O_5, 2.46; H_2SO_4, 0.17; SiO_2, 57.35; CO_2, —; K_2O, 4.47; CaO, 3.36; MgO, 2.99; Al_2O_3, 5.86; FeO, 15.03; H_2O, 8.20.

42. Green marl, from Hamilton Adam's pits, Clementon, Camden County, New Jersey: P_2O_5, 2.64; H_2SO_4, 0.44; SiO_2, 56.20; K_2O, 5.37; CaO, 1.98; MgO, 1.61; Al_2O_3, 6.00; FeO, 16.29; H_2O, 9.28.

43. Green marl, from G. Ayars's pits, near Jericho, Cumberland County, New Jersey.

44. Yellow marl, from G. Ayars's pits, near, Jericho, Cumberland County, New Jersey.

IV.—NATURAL FERTILIZERS.

A.—MINERAL FERTILIZERS (PHOSPHATE ROCKS).

1. Group of specimens of river rock, from Stono River, South Carolina, with fossil teeth and bones formed in connection with them.
2. Group of specimens of land rocks, with fossil teeth and bones, from Ashley River, South Carolina.
3. River phosphate, Coosaw River, South Carolina.
4. Land phosphate, Cohr's Place, Cooper River.
5. Land phosphate, Wando Mining and Manufacturing Company, Ashley River, South Carolina.
6. Bull River rocks.
7. Land phosphate, Boag's Place, South Carolina.
8. Land phosphate, Oak Point Mines, Bull River.
9. Land phosphate, Wando Mining and Manufacturing Company, Ashley River.

10. Marsh phosphate, Cohr's Place, Cooper River.

11. Fossil teeth, Coosaw River.

12. Fossil vertebra, Wando Mining and Manufacturing Company.

13. Elephant's tooth, Wando Mining and Manufacturing Company.

14. Fossil teeth, Coosaw River.

15. Fossil wood, Coosaw River.

Sample of phosphate rock weighing 1,590 pounds, from Charleston, S. C.

The following table shows the average composition of these materials:

Locality.	Moisture.	Organic matter.	Carbonic acid.	Carbonate of lime.	Phosphoric acid.	Bone phosphate of lime.	Sand.
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Stono River, ordinary air dried rock	3.68	4.78	4.68	10.64	25.61	55.91	11.55
Stono River, ordinary air-dried, dark phosphatic rock			4.28	9.73	26.68	58.24	11.76
Stono River, large nodule, weight 1,590 lbs., forwarded to Centennial Exhibition	1.50	5.59	3.89	8.84	25.75	56.21	12.41
Ashley River, hot-air-dried rock *	0.00	5.256	4.466	10.07	27.006	58.953	11.37
Coosaw River, hot-air-dried rock	0.57	4.31	3.79	8.61	27.26	59.51	9.06
Coosaw River, hot-air-dried rock	0.66	3.75	4.34	9.84	26.78	58.46	11.77
Bull River, hot-air-dried rock	0.79	5.80	3.61	8.19	25.14	54.88	13.30
Boag's Place, ordinary air-dried rock	10.07		3.545	8.06	27.11	59.18	15.395
Chisolm's Island, hot-air-dried rock	0.84	4.22	3.54	8.04	27.255	59.50	9.06

* The rock as delivered contained 7.41 per cent. of moisture, hence the content of bone phosphate of lime amounted to 54.59 per cent.

B.—VEGETABLE FERTILIZERS.

1. Marsh mud, from tide meadows, Atlantic City, Atlantic County' New Jersey.

2. Marsh mud, from banked meadows, Mannington, Salem County, New Jersey. The composition of this mud is represented in the following analysis of specimens from four localities other than that from which the sample exhibited was obtained: SiO_2, 60.62; Al_2O_3, 12.59; Fe_2O_3, 4.84; CaO, 0.76; MgO, 0.64; K_2O, 1.32; Na_2O, 0.98; Cl, 0.17; HSO_4, 0.92; P_2O_5, 0.16; organic matter and water, 15.61; hygroscopic moisture, 2.15.

3. Muck, from a swamp of deciduous and coniferous trees. H. A. Green, Atco, Camden County, New Jersey.

4. Muck, from savanna land, W. Regu, Atco, Camden County, New Jersey.

5. Muck, from a swamp of coniferous trees near Jackson, Camden County, New Jersey.

6. Seaweed—kelp. Contributed by Vinal N. Edwards, Wood's Holl, Mass.

7. Seaweed (rock weed), Vinal N. Edwards, Wood's Holl, Mass.

8. Seaweed (rockweed), Vinal N. Edwards, Wood's Holl, Mass.

9. Mesembryanthemum crystallinum, California.
10. Sueda californica, California.

The two plants last named grow largely upon the coast of California, and are supposed to be of value on account of the large percentage of mineral matter they contain, especially potassa, and also like kelp as a source of iodine.

C.—ANIMAL FERTILIZERS.

1. Cancerine, manufactured on the coast of New Jersey from the king crab (*Limulus polyphemus*) by drying and pulverizing. Contributed by Prof. George H. Cook.
2. Crude menhaden, residue remaining after extracting of oil.
3. Air-dried menhaden.
4. Steam-dried menhaden.
5. Pork cracklin, refuse from manufacture of lard.
6. Dried blood.

The last five materials were contributed by the Pacific Guano Company of Boston, Mass., and Charleston, S. C.

7. Atlantic Phosphate Company's dried flesh. Contributed by Dr. C. U. Shepard, jr., Charleston, S. C.
8. Bat excrement, from a cave near Georgetown, Williamson County, Texas. (Contributed by R. E. Talbot.)
9. Bat excrement, J. Bandera, Texas. (Contributed by J. A. V. Pue.)
10. Bat excrement, Spencer, Tenn. (Contributed by Hugh J. Brady.)
11. Bat excrement, Huntsville, Ala. (Contributed by J. E. Miller.)
12. Matter found disseminated through the deposits of bat excrement formed near Huntsville, Ala. (Contributed by J. E. Miller.)
13. Bat excrement, Benton County, Arkansas.
14. Bat excrement, San Antonio, Tex. (Contributed by H. Weir.)
15. Bat excrement, Bandera, Tex. (Contributed by J. A. V. Pue.)

The following table, taken from the Monthly Report of the Department for May and June, 1876, shows the composition of some of the samples mentioned above:

Constituents.	I.	II.	III.	IV.	V.	VI.	VII.
Sand, clay, insoluble silicate	1.068	82.29	0.46	2.153	1.885	0.447	62.660
Moisture	36.300	2.59	9.17	26.710	44.330	0.425	14.020
Organic volatilo matter	46.77		82.18	58.439	47.73	92.745	6.141
Alumina and sesquioxide of iron	0.356	8.06	0.17		0.463		
Soluble phosphoric acid	0.541	2.02	1.52	0 125	1.833	1.691	
Insoluble phosphoric acid	3.000		0.67	3.866	0.581	0.909	0.711
Lime	6.428	2.92	1.86		0.710		
Magnesia	0.666	0.38	0.38		Trace.		
Sulphuric acid		0.61	1.16		2.161		
Chlorine		Trace.	0.38		0.202		
Nitric acid			Trace.		0.258		
Potassa	1.590	Trace.	0.67	1.471	0.590	0.763	0.0707
Soda	0.750	Trace.	Not det.	0.425	0.312	0.160	0.152
Soluble silica		0.41					
Organic nitrogen	5.336		7.96	0.556	6.000	10.091	0.199
Ammonia (N. H.) corresponding to organic nitrogen				0.675	7.28	12.253	2.2416
Actual ammonia	0.528		1.24	0.132	2.013	0.472	
Undetermined	1.531			6.511			

The Roman numerals, at the top of the table, represent different samples as follows:

I. Sample from Brierfield, Ala. Part of the deposit from which it was taken was burned during the war, but this sample represents that portion which remains uninjured.

II. Sample from same deposit representing the remains of the burned portion. It has the appearance of dry, sandy soil.

III. Sample from Bandera, Tex.

IV. Sample from San Antonio, Tex.

V. Sample from Benton County, Arkansas.

VI. Sample from Georgetown, Williamson County, Texas.

VII. Sample from Cave City, Ky.

V.—COMBINATION OF NATURAL FERTILIZERS FOR THE PRODUCTION OF COMMERCIAL FERTILIZERS.

The next subdivision consists of materials representing the combination of the natural fertilizers for the production of the so-called commercial or artificial fertilizers. We show first the substances more generally used by manufacturers, arranged in the order in which they are applied in the process of manufacture. These series almost invariably contain imported articles, since these are necessary to the production of standard and first-class articles. The substances more largely imported for this purpose are nitrate of soda and the German potash salts. In many cases Peruvian guano is employed to supply ammonia.

We therefore divide this group into (1) Series illustrating process of manufacture of artificial fertilizers; (2) Manufactured articles.

The first series representing process of manufacture is that contributed by the Pacific Guano Company, of Boston, Mass., and Charleston, S. C., as follows:

1. South Carolina land.
2. South Carolina land, marsh.
3. South Carolina land, marsh, crushed.
4. South Carolina land, marsh, ground.
5. Sulphur.
6. Nitrate of soda.
7. Sulphuric acid.
8. A compound acid phosphate lime.
9. Sulphate ammonia.
10. German Leopoldshall Kainit.
11. Crude menhaden fish scrap.
12. Air-dried menhaden fish scrap.
13. Steam-dried menhaden fish scrap.
14. Dried meat pork cracklins.
15. Pacific Guano Company's fertilizer.

The following materials and analysis were contributed by Dr. C. U. Shepard, of Charleston, S. C. The next series represents the order of application of raw materials in the process of manufacture as carried on by the Wando Mining and Manufacturing Company, Charleston, S. C.:

No.	Materials.	Dissolved bone phosphate.	Reduced bone phosphate.	Available bone phosphate.	Undecomposed bone phosphate.	Total.	Ammonia.	Potash.
16	Ground bone phosphate							
17	Soluble bone phosphate	20.56	6.09	26.65	7.00	33.65		
18	Azotine							
19	Blood						13.345	
20	Kainite	SO_3 10.86	MgO 6.15	K_2O 14.73	Cl 40.98	K_2SO_4 27.21	12.31	
21	Muriate of potash			53.88	47.38	Kcl 85.32		
22	Sulphate of ammonia						23.25	
23	Guanape of guano	59.12						
24	Wando fertilizer			30.39			12.37	

The Stono Phosphate Company of Charleston, S. C., employ the following materials:

No.	Materials.	Dissolved bone phosphate.	Reduced bone phosphate.	Available bone phosphate.	Undecomposed bone phosphate.	Total.	Ammonia.	Potash.
25	Crushed rock							
26	Ground bone							
27	Dry blood						12.255	
28	Fish scrap							
29	Soluble guano	10.89	3.30	14.19	14.25	28.44		
30	Kainite							
31	Stono acid phosphate	14.87	3.95	18.82	16.55	35.37		

The following are specimens of some of the more important manufactured articles found in the markets. They were analyzed and contributed by Dr. C. U. Shepard, Charleston, S. C.:

No.	Materials.	Dissolved bone phosphate.	Reduced bone phosphate.	Available bone phosphate.	Undecomposed bone phosphate.	Total.	Ammonia.	Potash.
32	Lardy's ammoniated soluble Pacific guano.	10.87	5.13	16.00	7.13	23.13	2.60	1.38
33	Lardy's dissolved South Carolina bone phosphate.	26.25	0.66	21.21	16.37	37.58		
34	Lardy's pure ground South Carolina bone phosphate.							
35	Lardy's phospho Peruvian guano.	12.13	2.62	14.75	8.51	23.26	3.34	2.73

No.	Materials.	Dissolved bone phosphate.	Reduced bone phosphate.	Available bone phosphate.	Undecomposed bone phosphate.	Total.	Ammonia.	Potash.
36	Phœnix guano, imported from Phœnix Islands, South Pacific.	....	....	22.27	22.48	44.75	....	....
37	Wilcox, Gibbs & Co.'s manipulated guano, Charleston, S. C.	9.25	11.84	21.09	7.72	28.81	2.88	2.36
38	Robson's compound acid phosphate for composting with cotton-seed.	11.74	5.23	16.97	17.37	34.34	....	1.50
39	Robson's cotton and corn fertilizer.	10.89	3.30	14.19	14.25	28.44	3.04	1.50
40	Soluble Pacific guano, Pacific Guano Company.	10.87	2.30	13.17	3.78	16.95	3.00	1.68
41	Compound acid phosphate, Pacific Guano Company.	12.74	7.02	19.76	8.12	27.88	....	1.59
42	Etiwan crop food (chemical)..	19.86	0.48	20.34	2.80	23.14	....	10.48
43	Etiwan 24 per cent. dissolved bone.	23.05	2.88	25.93	6.02	31.95	....	....
44	Etiwan guano..................	15.01	3.10	18.11	3.11	21.22	3.12	3.81
45	Etiwan 29 per cent. dissolved bone.	29.51	0.50	30.01	....	30.01	....	....
46	Atlantic Phosphate Company's acid phosphate (without lime).	14.36	3.07	17.43	12.44	29.87	....	....
47	Atlantic Phosphate Company's acid phosphate (with lime).	5.58	8.47	14.05	18.74	32.79	....	1.50
48	Atlantic Phosphate Company's 27 per cent. dissolved bone	....	....	....	....	....	....	....
49	Atlantic Phosphate Company's fertilizer.	10.74	2.03	12.77	11.59	24.36	3.20	1.56
50	Atlantic Phosphate Company's phosphate dust.	....	....	....	....	58.72	....	....
51	Atlantic Phosphate Company's ground rock.	....	....	....	....	....	....	....
52	Atlantic Phosphate Company's lime.	....	....	....	....	13.25	CaO, CO_3, 10.23	CaO 47.15
53	Atlantic Phosphate Company's cracked rock (Ebaugh's patent crusher).	....	....	....	....	....	....	....
54	Atlantic Phosphate Company's guanape.	....	....	....	....	....	....	....
55	Carolina fertilizer..............	11.06	2.29	13.35	13.49	26.84	2.85	....
56	Bradley's patent	12.18	1.92	14.10	10.26	24.36	2.45	....
57	Guanape guano, G. W. Williams & Co.	....	....	30.39	....	....	12.37	....
58	Palmetto acid phosphate.......	14.36	3.07	17.43	12.44	29.87	....	....
59	Ammoniated superphosphate.	18.94	0.04	18.98	5.71	24.69	3.20	0.34
60	(Climax.)	....	....	....	....	....	....	....

The following specimens of manufactured fertilizers were contributed by Dr. J. H. Parker, Charleston, S. C.:

61. Russell Coe's ammoniated bone superphosphate of lime.
62. Mape's dissolved bone.
63. Mape's dissolved bone phosphate.
64. Mape's prepared fish guano.
65. Mape's potato and vegetable fertilizer.
66. Mape's nitrogenized superphosphate of lime.

B.—VEGETABLE PRODUCTS,

THE VALUE OF WHICH DEPENDS UPON THEIR CHEMICAL COMPOSITION, AND THE UTILIZATION OF WHICH INVOLVES CHEMICAL PROCESSES.

In this grand division we have not only the materials included in the above statement, but also specimens taken from the progressive stages of the economic processes through which the raw material must pass to prepare it for consumption. Following this plan, we have—

1. Cereals, and the products resulting from their utilization.

The utilization of cereals includes—manufacture of flour, starch, and alcoholic liquors.

The production of alcoholic liquors constitutes the subject for another group.

The manufacture of flour consists of grinding the grain, separation of flour (amylaceous and glutinous principles) from the bran (cellulose) and subsequent purification of the flour.

Under this head are exhibited specimens contributed by Deener, Cissel & Welch, of Georgetown, D. C., as follows:

Wheat before cleaning.
Wheat after cleaning, ready to grind.
Meal after grinding.
Unpurified middlings.
Purified middlings.
Flour, Welch's best family.
Flour from purified middlings, patent process.

Mr. A. M. Bond, Laurel Md., contributed the following:

1. Rye.
2. Rye chop or ground grain.
3. Rye bran.
4. Rye flour.
5. Corn.
6. Corn chop or ground corn.
7. Corn meal.
8. Corn bran.
9. Buckwheat.
10. Buckwheat chop or ground buckwheat.
11. Buckwheat flour.
12. Buckwheat bran.

E. C. Hazard & Co., contributed specimens of cereals prepared for the table by the Cereal Manufacturing Company of New York, by special methods, as follows:

13. Hulled wheat.
14. Steam cooked and desiccated wheat.
15. Steam cooked and desiccated wheat and barley flour.
16. Steam cooked and desiccated oatmeal.

17. Avena or oaten grits.
18. Dried sweet corn.
19. Samp or hulled corn.
20. Hominy or granulated corn.
21. Corn hulls—waste product from manufacture of samp.
22. Hulls resulting from manufacture of hulled wheat.

MANUFACTURE OF STARCH.

The separation of starch is effected by two methods: (1) By fermentation and (2) by washing with alkaline solutions.

Specimens illustrating the first method were contributed by O. A. Taft, jr., & Co., of Providence, R. I. They consist of materials representing production of starch from wheat, corn, rice, and potatoes, as follows:

STARCH PRODUCTS FROM WHEAT.

1. White winter wheat.
2. Minnesota spring wheat.
3. Winter-wheat flour.
4. Spring-wheat flour.
5. Wheat flour in process of fermentation.
6. Wheat starch in crude state, washed.
7. Winter-wheat starch fully crystallized.
8. Wheat-starch flour.
9. Gum for calico, made from wheat starch.
10. British gum from wheat starch.

Starch from corn.

11. Corn starch fully crystallized.
12. Corn-starch flour.

Starch products from potato.

13. Potato-starch crystals.
14. Potato-starch flour.

SUGAR.

In this country sugar is manufactured from sugar-cane, beet roots, and sap of the sugar maple (*Acer saccharinum*). Molasses is also manufactured from sorghum, but this is not represented in the collection, on account of our inability to secure specimens.

For the following specimens of sugar products representing manufacture of sugar from the cane in Louisiana and the South generally, the Department is indebted to Mr. M. S. Bringier, of New Orleans.

The specimens of beet sugar were taken from the museum of the Department, and the maple sugars were contributed by Dr. Charles A. Goessmann, Amherst, Mass.

A.—CANE SUGAR AND MOLASSES.

Woodland, A or No. 1, from B. Johnson.
Bradish, B or No. 2, from B. Johnson.
Bradish molasses from B. Johnson (Woodland centrifugal).
Terre Haute, A or No. 1, from J. W. Goodburg.
Terre Haute, B, or No. 2, from J. W. Goodburg.
Louisiana molasses from J. W. Johnson (from centrifugal).
Gold Mine Plantation from Octave Hymel.
Sackett Plantation (fair).
Woodland C, or No. 3.
La Reupitte from B. Bayhi.
Reserve Plantation (choice) from L. Goodheart.
T. O. M. (common).
Louisiana molasses, common.
Louisiana molasses, fair.
Louisiana molasses, fully fair.
Louisiana molasses, prime.
Louisiana molasses, choice.

B.—BEET SUGAR.

Dried beet-root. Theodore Gennert, Catsworth, Ill.
Crystallized sugar. Theodore Gennert, Chatsworth, Ill.
White beet sugar. Germania Sugar Co., Chatsworth, Ill. Jonathan Periam.
White beet sugar, No. 2. Jonathan Periam, Chatsworth, Ill.
Beet-root sugar. California.
Beet-root sugar. Joseph Duncan, esq., England.
Beet-root sugar. Grown and manufactured at Fond Du Lac, Wis.
Beet-root sugar. E. H. Jones & Bro.
Beet-root sugar. Hon. C. A. Eldridge, Fond Du Lac, Wis.
Beet-root sugar, first quality. Sacramento Valley, Cal.
Beet-root sugar, second quality, Sacramento Valley, Cal.

C.—SUGAR FROM SAP OF MAPLE.

1. Maple sirup.
2. Maple sirup, concentrated.
3. Maple sugar, raw.
4. Maple sugar, purified.
5. Maple sugar in cakes, raw.
6. Maple sugar in cakes, purified.
7. Maple sugar, crystallized.
8. Photograph of maple grove showing manner of collecting sap, &c.
9. Photograph showing manner of concentrating sap, &c.

VEGETABLE PRODUCTS PRESERVED FOR FOOD BY SPECIAL METHODS.

The methods employed for preservation of food are: (1) Desiccation; (2) hermetically sealing; (3) packing in sugar; (4) packing in brandy or other alcoholic liquors.

Desiccated fruits found in our markets are generally prepared by the patented methods for rapid drying. In illustration of these methods we have the following specimens dried by the Alden process, contributed by D. Wing & Bro., Rochester, N. Y.

1. Dried squash.
2. Dried squash, flour.
3. Dried sweet apples.
4. Dried sour apples.
5. Dried potatoes.
6. Dried onions.
7. Dried Lima beans.
8. Dried sweet corn.

Messrs. E. C. Hazard & Co., 192 and 194, Chambers street, New York, contributed the following specimens, dried according to the method patented by E. E. Mifford and Susan Peebles.

1. Dried apples, whole core removed.
2. Dried apples cut.

Fruits preserved by hermetically sealing, are put up either in glass jars or tin cans. F. H. Perry, Providence, R. I., furnished the following fresh fruits put up in glass:

1. Seckel pears.
2. Bartlett pears.
3. Crab-apple.
4. Peaches.
5. Quinces.
6. Raspberries.
7. Blackberries.
8. Currants.
9. Citron.
10. Tomato.
11. Sweet corn.

Messrs. W. K. Lewis & Bro., 93 Broad street, Boston, Mass., contributed the following specimens put up in tin:

Pears.
Apples.
Peaches.
Quinces.
Green peas.
Green beans.
Squash (Hubbard).
Golden pumpkin,

Green lima beans.
Green corn.
Tomato.
Asparagus.

Messrs. E. C. Hazard & Co. contributed the following specimens of fruits preserved in sugar, packed by Gordon & Dilworth, New York:

American cranberries, from the Fruit Growers' Trade Company of New Jersey.
Peaches, Gordon & Dilworth.
Raspberries, Gordon & Dilworth.
Cherries, Gordon & Dilworth.
Strawberries, Gordon & Dilworth.
Pine-apple marmalade, Gordon & Dilworth.
Limes, Gordon & Dilworth.

Messrs. Hazard & Co. also furnished the following specimens of fruits preserved in brandy:

Peaches.
Green gages.
Cherries.

The same dealers also prepare for the trade the following, specimens of which they have contributed:

Tomato catsup.
Queen olives.
Minced meat.
Grated horse radish.
Natural Tabasco peppers.
Dried Tabasco peppers.
Tabasco pepper sauce.
Residue from manufacture of Tabasco pepper sauce.

FERMENTATION AND DISTILLATION OF VEGETABLE SUBSTANCES.

A.—PRODUCTION OF ALE, PORTER, &C., BY FERMENTATION OF BARLEY EXTRACT.

Messrs. F. Dandelet & Co., Baltimore, Md., contributed the following:

1. Barley malt.
2. Barley malt, ground.
3. Brown malt for porter and brown stout porter.
4. Extract of barley malt (wort) boiled with hops.
5. Extract of barley malt boiled and fermented (ale).

William Massey & Co., Philadelphia, contributed the following:

Barley malt, whole grain
Barley malt, crushed.
Barley malt, extract, unfermented.

Barley malt, extract, fermented (ale).
XX ale.
Brown stout.
Brown barley malt.
Porter.

MANUFACTURE OF WHISKY FROM CORN AND RYE BY DISTILLATION OF THE FERMENTED PRODUCTS.

B.—WHISKY.

The series representing the manufacture of whisky from corn and rye was contributed by "Hannis Distilling Company" of Baltimore, Md., and Philadelphia, Pa.:

1. Corn.
2. Corn meal.
3. Rye.
4. Rye meal.
5. Rye malt, raw.
6. Rye malt, ground.
7. Barley malt.
8. Barley malt, crushed.
9. Barley malt, ground.

The following series of products are mixed with each other in given proportions for making the various yeast necessary to a maximum yield:

10. Barley malt extract.
11. Barley mash yeast.
12. Barley mash (fermented).
13. Barley malt meal (fermented).
14. Rye malt (fermented).
15. Barley malt mash yeast and rye flour (unfermented).
16. Fermented yeast.
17. Rough yeast.

The last mentioned yeast is really the rye mash employed for production of what is known as rye whisky.

For production of mixed rye and corn whisky, commonly called corn whisky, this rough yeast is mixed to make the next product on the list.

18. Corn mash.
19. Corn mash, malted.
20. Fermented beer.
21. Single distilled whisky.
22. Double distilled whisky.
23. Spirits, single rectified.
24. Spirits, double rectified.
25. Hopper distilled whisky, one month old.
26. Hopper distilled whisky, eight months old.
27. Whisky, seven years old.

Mr. Alex. Young, of Philadelphia, Pa., contributed the following specimens of whisky manufactured from wheat:

1876.
One year old.
Two years old.
Three years old.
Four years old.
Five years old.
Six years old.

C.—WINES PRODUCED BY FERMENTATION OF GRAPES.

The following were contributed by Bush, Son & Meissner, Saint Louis, Mo.:

Name of wine.	Composition.				
	Specific gravity.	Alcohol by volume.	Alcohol by weight.	Acid.*	Solids.
				Per cent.	*Per cent.*
1. American sherry	....	17.6	14.23	0.37	6.55
2. Norton's Virginia seedling	0.995	12.2	9.85	0.66	2.31
3. Herman	0.990	13.9	11.24	0.48	....
4. Alvey, 1875	....	10.1	8.13	0.78	2.52
5. Taylor Bullet, 1874	0.995	12.4	10.01	0.48	1.73
6. American port	1.03	13.1	10.59	0.48	11.30
7. Martha, 1873	0.995	11.3	9.11	0.43	1.72
8. Missouri claret	0.9975	11.8	9.51	0.72	2.37
9. Herbemont, 1874	0.995	11.8	9.51	0.57	2.42
10. Catawba, 1874	0.990	12.0	9.69	0.37	1.66
11. Catawba, 1875	0.995	11.0	8.87	....	1.53
12. Catawba sweet, 1875	1.015	14.4	11.65	0.40	7.86
13. North Carolina, 1874	0.990	13.5	10.92	0.48	1.80
14. Cynthiana, 1874	0.995	12.8	10.33	0.54	3.15
15. Goethe, 1873	0.990	11.8	9.51	0.42	1.68
16. Clinton, 1874	0.908	13.4	10.83	0.45	3.70
17. Delaware, 1874	0.990	13.1	10.59	0.40	2.18
18. Ives, 1874	0.995	11.2	9.03	0.54	2.29
19. Norton's, 1873	0.995	12.6	10.17	0.47	2.46
20. Concord, 1873	1.000	9.4	7.56	0.60	2.38
21. Concord, 1875	0.9975	8.7	6.99	0.48	2.36
22. Concord white, 1874	0.995	12.2	9.85	0.47	1.55

*Calculated as dry tartaric.

The wines of Virginia are represented in the collection by samples contributed by the Monticello Wine Company of Charlottesville, Va., as follows:

23. Claret, Norton's Virginia.
24. Claret, Clinton.
25. Claret, Virginia.
26. Hock.

Mr. L. J. Rose, Los Angeles, Cal., contributed the following California product:

27. California Port, 3 years old.
28. Blaue Elba Hock, last vintage
29. Blaue Elba Hock, 2 years old.

30. Grape-juice, plus sugar.
31. Spirits of wine or grape spirits (high proof).
32. California brandy, 5 years old.

PRODUCTS ILLUSTRATING THE PREPARATION OF TOBACCO FOR CONSUMPTION.

The specimens for this purpose were contributed by Messrs. P. Lorillard & Co., New York. They consist of—

A.—Chewing Tobacco (Fine cut).

1. Natural leaf for fine cut tobacco.
2. Leaf stemmed, and sweetened for fine cut tobacco.
3. Fine cut tobacco from cutting machine.
4. Fine cut tobacco furnished ready for consumption.

B.—Chewing Tobacco (Plug).

5. Kentucky leaf for fillers.
6. Kentucky leaf for fillers, after stemming and sweetening.

The leaf thus stemmed and sweetened is spread out in layers of requisite thickness, and cut in pieces of different sizes, making—

7. Plug uncovered, not pressed.

The pieces thus prepared are then covered with either of the three varieties of leaf according to color desired.

8. Kentucky leaf for dark wrapper.
9. Virginia leaf for dark wrapper.
10. Virginia leaf for bright wrapper.

When covered with the different wrappers we have—

11. Dark plug wrapped before pressing.
12. Bright plug wrapped before pressing.
13. Dark plug pressed ready for consumption.
14. Bright plug pressed ready for consumption. As waste materials resulting from the manufacture, we have—
15. Refuse scrap from plug tobacco.
16. Stems from dark wrappers and fillers.
17. Stems from bright wrappers and fillers.

C.—Smoking Tobacco.

18. Kentucky leaf for smoking tobacco.
19. Cut smoking tobacco.
20. Best smoking leaf in process of granulation.
21. Best smoking tobacco (granulated.)

D.—Snuff.

22. Virginia snuff leaf.
23. Virginia leaf cut for snuff not cured.
24. Virginia leaf cut for snuff and fermented.

The fermented product is separated into different parts according to the extent and character of the fermentation it has undergone, and is ground and placed upon the market as—

25. Scotch snuff.
26. Maccaboy snuff.
27. Coarse French Rappée snuff.

TANNING AND DYEING MATERIALS.

The number of materials adapted to application in the processes of tanning and dyeing, which are indigenous to the United States are limited. The tanning materials are restricted principally to sumac leaves and to oak and hemlock barks. There are, however, other leaves and barks containing sufficient tannic acid to merit some attention in this particular, and it has been the endeavor of the division to secure as many as possible of such materials, as may be found in sufficient quantities to warrant their application in the arts. These substances will be noticed in the list given below. Most of them have been described in the journals, and further description will be unnecessary. Those which have not been described are familiar.

The percentage of tannin contained in very many of these samples has been estimated, and the amount is mentioned in connection with the samples, respectively.

SUMAC.

For condensation of sumac for transportation to market, and removal of valueless material the leaves are carefully pulverized. The materials resulting from the process employed were contributed by Mr. German Smith, Winchester, Va., and by Martin Brothers & Baker, Hallsborough, Va., as follows:

From Winchester:

White sumac (*Rhus glabra*) leaves.
Black sumac (*Rhus cotinus*) leaves.
Ground sumac (mixed), containing 24.18 per cent. tannic acid.
Refuse from grinding sumac.

From Hallsborough:

Small dark leaf sumac (*Rhus cotinus*), containing 24.08 per cent. tannic acid).
Silver leaf sumac (*Rhus glabra*).
Sumac stems separated by grinding.
Mixed sumac, ground.

LEAVES OF OTHER PLANTS.

Leaves of sweet fern (*Comptonia asplenifolia*). Contributed by William S. Soule, Boston, Mass.

Leaves of *Polygonum amphibium*. Contributed by ——— ———, Chicago, Ill., containing 11.6 per cent. tannic acid.

Sumac leaves. Contributed by S. A. Day, Fort Scott, Kans., *Ephedra antisyphilitica*, from table-lands of Arizona and Utah, containing 11.9 per cent. tannic acid.

BARKS.

Bark of sweet gum (*Liquidambar styraciflua*) from District of Columbia, containing 8.36 per cent. tannic acid.

Quercus rubra (red oak) from Canton Ill., containing 5.55 per cent. tannic acid.

Quercus alba (white oak), Canton, Ill., containing 3.35 per cent. tannic acid.

Quercus coccinea, Canton, Ill., containing 7.78 per cent. tannic acid.

Quercus macrocarpa, Canton, Ill., containing 7.85 per cent. tannic acid.

Crushed quercitron bark (*Quercus nigra*), from German Smith, Winchester, Va., containing 6.47 per cent. tannic acid.

Quercus nigra, rough, from Boston Dyewood and Chemical Company, Hanover, Pa.

Quercus nigra, rossed.

Quercus nigra, rossed, for manufacture of quercitron.

J. F. Hixon &c., Van Ettenville, N. Y., contributed the following specimens illustrative of manufacture of extract of hemlock bark. The list will explain itself:

Hemlock bark (*Abies canadensis*), containing 9.5 per cent. tannic acid, rough.

Hemlock bark, rossed.

Rossings, or outside of hemlock bark.

Ground hemlock bark.

Liquor obtained from leaching hemlock bark.

Concentrated leachings, extract.

Sediment from concentrated leachings.

Spent tan, or residue after leaching.

Of the coloring matters manufactured from indigenous products, flavine from oak bark is probably the most important. It is extensively produced by the Boston Dyewood and Chemical Company, at their works at Hanover, Pa. We have obtained through the courtesy of this company the following series of specimens used in and resulting from the process of manufacture:

Crude black-oak bark.
Shaved black-oak bark.
No. 1. Shredded bark.
No. 1 Baltimore bark.
No. 2. Baltimore bark.
Fine-ground Philadelphia bark.
Bolted bark (common).
Extra bolted bark.
Shrewsbury mills black-oak liquor.

Shrewsbury mills black-oak extract.
Shrewsbury mills C. flavine.
Shrewsbury mills C. S. flavine.
Shrewsbury mills X flavine.
Shrewsbury mills XX flavine.

MISCELLANEOUS DYE-STUFFS.

Barberry root, from B. P. Clapp & Co., Pawtucket, R. I., through Prof. J. M. Ordway, Boston, Mass.
American indigo, from Paul S. Felder, Orangeburg, S. C.
Orchilla weed, from W. K. Ross & Bro., New York City.
Cudbear, manufactured from orchilla weed, by W. K. Ross & Bro., New York City.

DRY DISTILLATION OF WOOD.

This process is carried on more especially for the production of acetic acid. The harder and more compact woods are generally employed. When heated in closed retorts to low red heat they yield, besides crude acetic acid, methyl alcohol, methyl acetate, &c., and tarry matters. These substances are separated either by collection in different condensors or by fractional distillation. The amount of acetic acid produced from wood varies from 1½ to 3½ per cent. of the weight employed. In its crude state it is called pyroligneous acid, and as such is largely used for manufacture of pyrolignites of lime, iron, alumina, manganese, &c., which are extensively employed in dyeing and calico printing.

The series of specimens illustrating this branch of manufacture, which is one of considerable importance in the United States, was prepared under the direction of Prof. J. M. Ordway, of the Massachusetts Institute of Technology, Boston, Mass., the materials being furnished by B. P. Clapp & Co., of Pawtucket, R. I.

1. Oak wood.
2. Birch wood.
3. Maple wood.
4. Methyl alcohol (wood spirit).
5. Pyroligneous acid.
6. Wood tar.
7. Charcoal residue.
8. Pyrolignite of iron.
9. Pyrolignite of lead.
10. Acetate of lime (brown).
11. Acetate of lime (gray).
12. Pure acetic acid.

To illustrate the application of the acetates of iron and alumina as mordants in calico printing, Professor Ordway obtained from Wheelwright, Anderson & Co., manufacturers of "Merrimac Prints," Boston and New York, specimens of calico as follows:

13. Specimen after application of acetate of alumina mordant.

14. Same after ageing and dunging.
15. Same after dyeing with madder.
16. Specimen after application of acetate of iron mordant.
17. Same after ageing and dunging.
18. Same after dyeing with madder.

The following collection of products obtained from the pine was prepared by Dr. J. H. Parker, Charleston, S. C.

In this series the specimens numbered 1 to 4 represent the raw product collected directly from the pine trees, principally from *Pinus australis* of the Carolinas, from which they exude when portions of the bark are removed and the surface of the wood is made bare. The crude turpentines are subjected to distillation with water, when 10 to 25 per cent. passes over as a distillate consisting of spirits of turpentine, which must be purified by redistillation. This product in the different stages of rectification is represented by the specimens numbered 5 to 9, respectively. When the distillation is carried so far that all the water and turpentine are removed, rosin, the different grades of which are represented by specimens numbered 10 to 23, remains as a residue. This may be more or less colored, according to the care observed in selection of the raw materials used, and in conducting the process of distillation.

If the temperature of distillation be increased sufficiently the residue yields a product known as rosin oil, represented by specimen No. 24.

The old trees of the pine forests which are no longer capable of yielding crude turpentine, and which are of no value for lumber, are removed and subjected to dry distillation, and from this process tar, containing a number of volatile substances and rosin and paraffine, as solid constituents, is obtained. When subjected to distillation the volatile constituents are removed, leaving a residue known as pitch. These products are represented by specimens numbered 25 and 26.

1. Scrape or hard, crude turpentine.
2. Crude turpentine, yearling or second clip.
3. Crude turpentine, yellow dip.
4. Crude turpentine, virgin dip.
5. Spirits turpentine, colored, unmerchantable.
6. Spirits turpentine, one shade.
7. Spirits turpentine, two shades.
8. Spirits turpentine, three shades.
9. Spirits turpentine, white.
10. Black rosin.
11. Common strained rosin.
12. Fine strained rosin.
13. Low No. 1 rosin.
14. No. 1 rosin.
15. Extra No. 1 rosin.
16. Low No. 2 rosin.
17. No. 2 rosin.

18. **Extra No. 2 rosin.**
19. **Low pale rosin.**
20. **Pale rosin.**
21. **Extra pale rosin.**
22. **Opaque rosin.**
23. **Window-glass rosin.**
24. **Rosin oil.**
25. **Pine tar.**
26. **Pitch.**

VEGETABLE OILS.

The oils obtained from vegetable products may be divided into two classes, according to their properties and the methods employed for their extraction, viz:

A.—Fixed oils separated by pressure.

B.—Volatile oils, separated by distillation.

The fixed oils manufactured in this country are linseed oil obtained from flaxseed (*Linum usitatissimum*), oil of cotton seed (*Gossypium*), and castor oil from castor beans (*Ricinus communis*).

The process employed in the manufacture of these oils is essentially the same, but there are certain differences in the details. The flaxseed and castor beans are crushed and carried directly to the press, but the cotton seed, on account of the lint accompanying it, and its hard hull or shell, must firs the decorticated. The difference in the methods is quite evident from the character of the specimens representing them.

The specimens representing manufacture of linseed and castor oils were contributed by R. B. Brown & Co., Saint Louis, Mo., and the cotton seed products by A. A. Maginnis' Sons, New Orleans, La.

1. **Flaxseed.**
2. **Ground flaxseed as prepared for the press.** This is the form used for medical purposes.
3. **Oil cake.**
4. **Oil cake, ground, for cattle food.**
5. **Raw linseed oil.**
6. **Boiled linseed oil.**
7. **Castor beans.**
8. **Castor beans, crushed (pomace).**
9. **Castor cake, ground, for fertilizer.** It contains 5.5 per cent. nitrogen and 4.5 per cent. phosphate of lime.
10. **Brilliant castor oil.**
11. **No. 3 castor oil for lubricating, oiling harness, &c.**
12. **Raw cotton seed.**
13. **Cotton seed with lint removed.**
14. **Cotton-seed hulls.**
15. **Lint from cotton seed.**
16. **Cotton-seed meal.**

17. Crude cotton-seed oil.
18. Refined cotton-seed oil.
19. Refined and bleached cotton-seed oil.
20. Ash from cotton seed.
21. Harness soap made from cotton seed.
22. Laundry soap made from cotton seed.
23. Fullers' soap made from cotton seed.

Of the volatile or essential oils there are fourteen manufactured from indigenous products in the different States.

Those exhibited are as follows:

24. Oil of cedar, product of New Jersey.
25. Oil of erigeon, product of Vermont.
26. Oil of golden rod, product of Virginia.
27. Oil of horsemint, product of New York.
28. Oil of hemlock, product of Michigan.
29. Oil of neroli, product of Louisiana.
30. Oil of petit grain, product of Louisiana.
31. Oil of peppermint I, product of New York.
32. Oil of peppermint II, product of Michigan.
33. Oil of peppermint III, product of Wisconsin.
34. Oil of pennyroyal, product of southern States.
35. Oil of Sassafras, product of southern States.
36. Oil of spearmint, product of New York.
37. Oil of wintergreen, product of New York and Pennsylvania.
38. Oil of wormseed, product of Maryland.
39. Oil of wormwood, product of Maryland.
40. Oil of castor I, product of Western States.
41. Oil of castor II, product of Texas.

PRODUCTS OF THE AMERICAN MATERIA MEDICA.

Prof. E. S. Wayne prepared for exhibition the following specimens of the more important indigenous materials belonging to the American materia medica:

1. Seed of *Lobelia inflata* (lobelia). Natural order, Lobeliaceæ.
2. Lobelina, alkaloid from lobelia seed.
3. Oil of lobelia.
4. Root of *Sanguinaria canadensis* (blood-root). Natural order, Papaveraceæ.
5. Sanguinarina, alkaloid from blood-root.
6. Sanguinarina sulphate.
7. Root of *Podophyllum peltatum* (May apple). Natural order, Berberidaceæ.
8. Podophyllin, resin from May-apple root.
9. Root of *Gelsemium sempervirens* (yellow jessamine). Natural order, Apocynaceæ.
10. Gelseminia, alkaloid from yellow jessamine.

11. Gelsemic acid, acid from yellow jessamine.
12. Gelsemate of ammonia (solution).
13. *Marrubium vulgare* (horehound). Natural order, Lauriaceæ.
14. Marrubin, from horehound.
15. Bark of *Celastrus scandens* (false bitter-sweet). Natural order, Celastraceæ.
16. Celastrin, alkaloid from *Celastrus scandens.*
17. Root of *Inula helenium* (elecampane). Natural order, Asteraceæ.
18. Helenin, alkaloid from elecampane root.
19 *Veratrum viride* (American hellebore). Natural order, Melanthaceæ.
20. Veratroidia, alkalide from hellebore.
21. Jervia, alkaloid from hellebore.
22. *Trillium pendulum* (beth root). Natural order, Trilliaceæ.
23. Trilline, active principle of beth root.
24. *Arctostaphylos uva ursa* (uva ursi). Natural order, Ericaceæ.
25. Arbutin, alkaloid from leaves of uva ursi.
26. *Gaultheria procumbens.* Natural order, Ericaceæ.
27. Salycylic acid from Gaultheria.
28. *Datura stramonium* (stramonium seed). Natural order, Solanaceæ.
29. Daturia, alkaloid from stramonium seed.
30. Oil of stramonium obtained from the seed.
31. Prickly-ash berries, fruit of *Xanthoxylum fraxineum.* Natural order, Xanthoxylaceæ.
32. Xanthoxyline, alkaloid from prickly-ash berries.
33. Blackroot, root of *Leptandra virginica.* Natural order, Scrophulariaceæ.
34. Scrophularine, alkaloid from black root.
35. Leptandrin, crude resin from *Leptandra virginica.*
36. Manirite, glucoside from *Leptandra virginica.*
37. Flaxseed, variety, *Linum usitatissimum.* Natural order, Sinaceæ.
38. Bark of white willow, *Salix alba.* Natural order, Saliaceæ.
39. Salacine, alkaloid from white willow.
40. *Hydrastis canadensis.* Natural order, Ranunculaceæ.
41. Berberina, alkaloid from *Hydrastis canadensis.*
42. Hydrastia, alkaloid from *Hydrastis canadensis.*
43. Hydrochlorate of berberina.
44. Apple tree bark, *Pyrus malus.* Natural order, Rosaceæ.
45. Phloridzine, alkaloid from bark of *Pyrus malus.*
46. Castor-oil, from seeds of *Ricinus communis.*
47. Ricinine, from seeds of *Ricinus communis.*
48. Crude tartar, made from lees of wine.
49. Bitartrate of potassa (pure).
50. Rochelle salt, tartrate of soda and potassa.

MATERIALS ILLUSTRATING MANUFACTURE OF BUTTER AND CHEESE.

The specimens comprising this portion of our collection were prepared and analyzed under the direction of Prof. G. C. Caldwell, of Cornell University, Ithaca, N. Y. The collection has been described by Professor Caldwell in the Monthly Report of the Department of Agriculture for June and July; and we will transcribe here an abstract of his description before proceeding to the tabulation of the materials and their composition.

The collection begins with salt generally employed, with analyses showing the comparative value of the best English and American products found in our markets. The results of the analyses prove that for the purpose in question the American product is quite as good as that of English manufacture.

The coloring matter employed in this country is the pigment obtained from annatto seed. Some dairymen prepare the coloring matter directly from the seed, but the majority find it more convenient to use that found in the markets, and known as basket annotto. This product is further purified by certain manufactures for the preparation of annottoine and golden extract of annotto.

The amount of coloring matter contained in these products cannot be estimated directly, and can only be determined approximately, according to the percentage of organic matter present which seems to vary materially with the value of the product.

Of rennet two varieties are found. Between them there can be little choice depending upon chemical characteristics since there is no known method of determining the proportion of the coagulating principle with accuracy.

With regard to manufacture of cheese in the United States the methods employed are limited, and in the principal factories are generally confined to three. Of these, that most commonly employed yields what is known as "whole milk cheese" made from the entire milk, without skimming, or removal of the cream.

Another method, largely employed, consists in the use of skim milk, or milk from which cream has been removed for manufacture of butter. This method is sometimes modified by heating the milk to 130° F., then cooling it to 65°, and allowing it to stand from twenty-four to forty-eight hours, when the cream which separates is removed, and churned sweet. To the skim milk remaining, after removal of cream, the buttermilk obtained in churning is added and the whole employed in the manufacture.

With regard to the comparative value of the two varieties of cheese resulting from these processes it has been found that while the skim-milk cheese contains a larger proportion of fat than the scalded milk and buttermilk cheese, the latter has a more favorable consistency, and is probably more digestible. The quantity of fat present in different samples of skim-milk cheese is not as constant as in whole milk.

A third method, which has not been long in use, in this country, and is employed in a limited number of factories, consists in restoring to the skim milk used, the fat removed in the cream by the addition of as much clean animal fat, manufactured from beef suet, as it will absorb. After coagulation the excess of fat floating on the surface is skimmed off. The amount to be added cannot be determined precisely beforehand, since the quantity taken up *by the curd* is so variable—the percentage contained in the cheese obtained, according to analyses, made at Cornell University, ranging from 18 to 25.9 per cent. This oleomargarine cheese, as it is called, is considered superior to skim cheese; though, according to comparison of the two varieties of skim cheese mentioned, this quality cannot depend wholly upon the larger proportion of fat present.

With one exception the styles of cheese found in the markets in Europe are not imitated in this country. In one place in the State of New York limburger cheese is manufactured very nearly according to the process as carried on in Europe. It contains a large portion of water—43.67 per cent. and about 30 per cent of fat.

The materials employed in the three methods already noticed, and the by-products resulting, with a statement of their composition, are given in the list in connection with the principal products.

The whey butter exhibited is obtained from the whey resulting from the manufacture of whole milk cheese which always contains a considerable proportion of fat. It it asserted that this fat may be removed without affecting the feeding value of the whey. While the quality of this butter for table purposes is far inferior to the samples of Jersey butter, and factory butter, exhibited along side, this difference is not revealed by chemical analysis.

As miscellaneous products there are exhibited specimens of Borden's condensed milk and whey oil. The latter is prepared from whey, and is used for oiling the cheese in the curing room.

For more detailed description of the process the reader is referred to Professor Caldwell's article in the Monthly Report of the Department of Argiculture for May and June, 1876.

Materials illustrating the manufacture of dairy products.

SALT.

Materials.	Pure salt calc. from the chlorine.	Lime.	Sulphuric acid.
1. Syracuse salt	97.74	0.4	0.62
2. Ashton's Liverpool salt	97.71	0.59	0.9
3. Worthington's Liverpool salt	97.65	0.55	0.74
4. Marshall's Liverpool salt	97.99	0.47	0.72
5. Dean Brothers' Liverpool salt	97.77	0.52	0.91

Materials illustrating the manufacture of dairy products—Continued.

ANNATTO.

Materials.	Water.	Ash.	Organic matter.
6. Annatto seed	32. 64	10. 78	58. 58
7. Basket annatto, No. 1	22. 96	28. 83	48. 21
8. Basket annatto, No. 2	44. 18	8. 34	47. 48
9. Basket annatto, No. 3	9. 13	4. 66	86. 21

10. Annattoine.
11. Golden extracts of annatto.

RENNET.

12. Domestic rennet.
13. Foreign rennet.

Factory cheese from whole milk.

Description.	Water.	Ash.	Fat.	Caseine, &c.	Sugar.
14. Fresh milk	87. 49	0. 65	3. 58	4. 04	4. 24
15. Curd	42. 59	3. 37	31. 16	22. 88	....
16. Whey	92. 63	0. 68	0. 3	1. 46	4. 93
17. Ripe cheese	35. 70	3. 41	36. 07	25. 82	....

Description.	Water.	Ash.	Fat.	Caseine, sugar, &c.
18. New York factory cheese, No. 1	31. 41	3. 53	37. 88	27. 18
19. New York factory cheese, No. 2	35. 68	3. 60	35. 15	25. 57
20. New York factory cheese, No. 3	35. 24	3. 23	35. 68	25. 85
21. New York factory cheese, No. 4	33. 73	4. 05	35. 57	26. 65
22. Massachusetts factory cheese, No. 1	34. 18	3. 02	33. 92	28. 88
23. Massachusetts factory cheese, No. 2	38. 5	3. 73	31. 19	26. 58
24. Maine factory cheese, Jersey milk	28. 11	2. 71	41. 03	28. 15
25. Wisconsin factory cheese	35. 49	3. 34	34. 05	26. 12

Creamery butter and cheese (ordinary "skim-cheese").

Description.	Water.	Ash.	Fat.	Caseine, &c.	Sugar.
26. Fresh milk	87. 48	0. 69	3. 7	4. 09	4. 04
27. Skim milk	89. 91	0. 62	1. 1	4. 32	3. 95
28. Cream	67. 03	0. 73	26. 17	6. 07	....
29. Butter	8. 82	3. 43	87. 75		....
30. Buttermilk	....	....	....	....	....
31. Curd	49. 90	2. 55	11. 80	35. 69	....
32. Whey	93. 70	0. 47	0. 21	1. 91	3. 71
33. Ripe cheese	42. 38	3. 63	20. 55	33. 44	....
34. Scalded skim-milk cheese	44. 48	4. 50	15. 22	45. 80	

Creamery butter and cheese (oleomargarine), by the Freeman patent process.

Description.	Water.	Ash.	Ash.	Caseine, &c.	Sugar.
35. Fresh milk	87.55	0.69	3.70	3.77	4.23
36. Skim-milk	90.51	0.79	0.67	4.18	3.85
37. Cream	70.33	0.45	23.09	6.13	....
38. Butter	12.36	2.98	84.66		....
39. Buttermilk	93.79	0.28	0.68	2.74	2.51
40. Oleomargarine	0.18	0.00	99.82	....	....
41. Curd	50.91	2.59	14.06	32.44	....
42. Whey	92.70	0.40	0.12	2.48	4.30
43. Ripe cheese	40.56	3.98	20.43	36.97	....
44. Limburger cheese	....	....	....	....	....
Sage cheese	....	....	....	....	....

Samples of butter.

Description.	Water.	Ash.	Fat.	Caseine, &c.
45. Jersey butter	11.29	3.20	84.76	0.75
46. Factory butter	12.36	2.98	83.41	1.25
47. Do	8.82	3.43	87.75	
48. Whey butter	9.77	1.67	88.56	

Miscellaneous products.

49. Condensed milk (Borden's).

Composition: Water, 23.6; Ash, 1.87; Fat, 11.19; Caseine, (by difference) 14.71; Milk-sugar, 12.43; Cane-sugar, 36.20.

50. Whey oil.

A CATALOGUE

OF THE

FOREST TREES OF THE UNITED STATES WHICH USUALLY ATTAIN A HEIGHT OF SIXTEEN FEET OR MORE,

WITH

NOTES AND BRIEF DESCRIPTIONS OF THE MORE IMPORTANT SPECIES,

ILLUSTRATING THE

COLLECTION OF FOREST-TREE SECTIONS ON EXHIBITION BY THE DEPARTMENT OF AGRICULTURE AT THE INTERNATIONAL EXHIBITION, 1876.

PREPARED BY

GEO. VASEY, M. D.

FOREST TREES OF THE UNITED STATES.

CENTENNIAL COLLECTION.

SIR: The following list is a catalogue of the native and naturalized forest trees of the United States which attain a height of 16 feet and upward. Descriptive notes of many species are appended.

By an act of the last Congress an appropriation was made to enable the different Departments of the Government to participate in the International Exhibition of 1876. In pursuance of this object, the Department of Agriculture undertook to make a collection to represent the trees of the United States. The aim was to represent every important tree by botanical specimens of the leaves, flowers, and fruit, and also by sections of the trunk, showing the appearance of the bark and of the wood; thus giving the completest possible view of every species. The great extent of our country and the immense variety of our arborescent vegetation made this of necessity a great undertaking. Well knowing that the chief value of such a collection would depend upon its scientific accuracy, arrangements were made to engage competent persons in the different fields of labor. In some portions of the country, local botanists were employed to collect the trees of their particular districts. But for the larger portion of the country it was necessary to employ traveling agents, whose duty it was to explore a designated section, ascertain the localities of the trees desired, collect the proper botanical specimens at the right season, and, having carefully noted the localities, to return at the end of the growing period and obtain sections of the trees.

As collector for the Southern States, Mr. A. H. Curtiss, of Liberty, Va., a well-known botanist, was engaged.

A large number of the trees of the Middle States were obtained in the vicinity of Washington. Of these, thirty species were procured from a part of the General Washington estate at Mount Vernon, now owned by Dr. E. P. Howland.

The trees peculiar to the New England States were procured by Mr. C. G. Pringle, of Charlotte, Vt.

As collector for the Western States, Mr. John Wolf, of Canton, Ill., was employed. In making the collection in Colorado, he was assisted by Mr. C. W. Derry, of Granite, Lake County, Colorado.

The semi-tropical trees of Southern Florida were obtained by Dr. A. W. Chapman, of Apalachicola, during a two months' cruise by schooner on the west coast, among the various keys and inlets, and far into the interior by the Caloosahatchee River. Dr. Chapman is an old resident of Florida, author of the "Flora of the Southern States," and better acquainted with the vegetation of that region than any other person.

A portion of the trees of Texas were obtained by Dr. S. B. Buckley, of Austin, whose labors in developing the botany of that section are well known; and a portion were collected by Dr. F. G. Lindheimer, a veteran botanist, whose collections of Texas plants, made many years ago, enrich the principal herbaria of the country.

In Utah, Mr. L. F. Ward, botanist of the survey of the Colorado River by Messrs. Powell and Thompson, made the collection of the trees of that region.

The trees of the high sierras of California and Nevada were procured by Mr. J. G. Lemmon, of Sierra County, California. The magnificent conifers of that region are represented by large wedge-shaped sections of trees from 4 to 7 feet in diameter, the preparation of which cost a great amount of toil and expense. The immense trees had to be felled, and the desired sections removed by sawing and splitting with wedges until the portions were reduced to proper size.

The trees of the Pacific slope in California were collected by Mr. G. R. Vasey, with valuable aid and assistance from Dr. A. Kellogg, of San Francisco, Dr. J. G. Cooper, and others.

Dr. Edward Palmer made the collection for the southern portion of California, Arizona, and Southern Utah.

Mr. A. J. Dufur, Centennial Commissioner for Oregon, collected the peculiar trees of that State.

After the woods were received at Washington, they were taken to a mill and reduced to the uniform length of two feet; then each section was divided by sawing longitudinally into two pieces, which were planed on the sawed surface, one arranged to show the outer or bark surface and the other to show the grain of the wood, its color, density, &c.

The corresponding botanical specimens for each species are displayed in frames arranged in the immediate vicinity of the trees to which they belong. By this means, an intelligent view of the appearance and properties of every species of the trees of the country may be obtained.

Great difficulty was experienced in deciding upon the limitations of height and size which should characterize a tree. It is well known that certain plants which are only shrubs in some places become large trees in other places; sometimes the difference depending on climate and sometimes on other circumstances. Thus, *Magnolia glauca*, or White Bay, grows and matures its flowers and fruit in some portions of Massachusetts where it attains only the size of a large shrub. It, however, steadily increases in size in situations farther south, until in Georgia and Florida it attains the size of a large tree. In some places, the same plant appears as a shrub or a tree, under different circumstances, in closely contiguous localities. Dr. Chapman, who made the collection of the trees of South Florida, says: "I was much disappointed in the size of most of the forest growth in that region. A peculiarity of these tropical trees is, that for miles they occur to you as mere shrubs, when at some other locality you find them lofty trees." As a general rule, I have not admitted into the collection any tree which does not, under favorable circumstances, attain a height of 20 feet and a diameter of 4 inches. Yet, in a few cases, in order the more fully to illustrate a family, a tree has been admitted which would fall below that standard. The accompanying catalogue enumerates about 400 species, the greater portion of which are represented by specimens in the collection.

Some portions of the country have been so incompletely explored that our knowledge of their vegetation is imperfect; yet it is probable that this catalogue presents, with great accuracy, our present knowledge of the trees of the United States. In two or three instances only, foreign species have been admitted, because of their extensive naturalization in some sections.

The two largest genera of trees are the oaks and the pines, of which we have about 30 species of each. Of coniferous trees, including the Pines, Firs, Cedars, Larches, Cypresses, Sequoias, &c., we have about 60 species. The Rose family, including the Plums, Cherries, Thorns, &c., is represented by over 30 species. Of the order *Leguminosæ*, or trees of the pod-bearing family, we have over 20, embracing the Locusts, Acacias, Redbuds, Mesquits, &c. Of Ericaceous trees we have 8 species, including the Californian Manzanita and Madrone trees, the Sorrel tree of the Southern States, and others. Of Maples we have 8; of Magnolias, 7; of Ash, 11; of Elms, 6; of Walnuts and Hickories, 13; of Poplars, 8; and of Birch, 6 species.

The usual difficulty has been encountered of deciding as to the standing of certain forms which some botanists regard as species and others as only varieties. In most well-marked cases, these are entered in the catalogue under distinct numbers, either as species or as varieties, as the evidences in the case seemed most convincing.

The range, or botanical region, of each species is indicated in a general manner, thus: Those trees which occur more or less extensively over the whole or the larger portion of the country east of the base of the Rocky Mountains or east of the Mississippi River are marked Eastern United States. This region is subdivided, by a line running eastward from the mouth of the Ohio River to the Atlantic, into two portions, one of which is called Northeastern United States, and the other Southeastern United States. Other localities are indicated as Southern States, New England States, Western States, Alleghany Mountains, &c. The western portion of the United States and Territories is marked in detached regions, as follows: Rocky Mountains of Colorado, or Rocky Mountains of Colorado and Utah; Sierra Nevada Mountains of California, Oregon, and Washington Territory; California; Southern California; Arizona. The portion of the country adjoining the Mexican border is indicated by the locality Western Texas and westward.

Certain portions of our country have not yet been sufficiently explored to determine accurately all the species of trees thereto belonging. This is the case with respect to the southern portion of Florida. Some species which at one time were thought to be indigenous in that region have not been confirmed by any late investigations, and will probably have to be erased from our list. The same difficulty occurs with respect to some of the trees of the Rocky Mountains and the western coast, particularly the Conifers and the Willows.

In the short time allotted to making this collection, it has not been possible to obtain wood specimens of *every* species given in the catalogue. The number wanting, however, is but a small percentage of the whole.

Among the good results growing out of this work, we may mention, first, that much information has been gained respecting species hitherto imperfectly known; and, secondly, that four or five new species, or species before unknown to our flora, have been obtained. These are mainly in South Florida, and include two exogens, viz, an Anona or Custard Apple, and a Chrysophyllum or Star Apple; and one endogen, a Palm of the genus *Thrinax*.

I wish to record my sincere thanks to the Hon. F. Watts, Commissioner, and to Mr. William Saunders, Representative of the Department at the Exhibition, for all possible assistance rendered in the prosecution of the work.

Respectfully,

GEO. VASEY,
Botanist.

HON. FRED. WATTS,
Commissioner.

MAGNOLIACEÆ.

No. 1. *Magnolia grandiflora*, L.—Evergreen Magnolia.—Southern States. A large and beautiful tree, with thick glossy evergreen leaves, and large white flowers, which are exceedingly fragrant.

No. 2. *Magnolia glauca*, L.—Sweet Bay; White Bay.—Massachusetts southward. Northward, this is only a small tree or shrub; but in the South it attains a large size, and the leaves become evergreen.

No. 3. *Magnolia umbrella*, Lam.—Umbrella Tree.—Southern States; Alleghany Mountains.

No. 4. *Magnolia acuminata*, L.—Cucumber Tree.—New York; South and West. This species has a greater range to the northward, where it sometimes attains a large size.

No. 5. *Magnolia cordata*, Michx.—Yellow Cucumber Tree.—Southern States.

No. 6. *Magnolia Fraseri*, Walt.—Long-leaved Cucumber Tree. Southern States.

No. 7. *Magnolia macrophylla*, Michx.—Large-leaved Umbrella Tree.—Southern States.

No. 8. *Liriodendron tulipifera*, L.—Tulip Tree; Yellow Poplar.—Eastern United States. One of the largest and most beautiful of North American trees. In the Western States, it attains an immense size. It is found principally in the rich bottom-lands of the large rivers, where its wood is extensively employed for building purposes and for the manufacture of furniture. As an ornamental tree, it is hardly surpassed by any other; its form being regular, its foliage peculiar and pleasing, and its abundant flowers, though not highly colored, are yet very beautiful.

ANONACEÆ.

No. 9. *Anona*.—Custard Apple.—Southern Florida. Discovered by Dr. Chapman in South Florida. It grows 15 to 20 feet high. The fruit is small and eatable when fully ripe. The species is undetermined.

No. 10. *Asimina triloba*, Dunal.—Papaw.—From Pennsylvania southward. A small tree, very common in the Southern States, less frequent at the North. It produces an oblong pulpy fruit about 4 inches long, which when ripe has a rich luscious taste.

CAPPARIDACEÆ.

No. 11. *Capparis Jamaicensis*, Jacq.—Caper Tree.—South Florida. A shrub or small tree of South Florida, also growing in the West Indies. The true capers of commerce are the fruit of the Old World species.

CANELLACEÆ.

No. 12. *Canella alba*, Swartz.—White Wood; Wild Cinnamon.—South Florida. A small tree in South Florida. In the West Indies, it is abundant, and called Wild Cinnamon and White Wood. The bark is aromatic and tonic, and is much employed in medicine.

TAMARISCINEÆ.

No. 13. *Fouquiera splendens*, Eng.—Western Texas and Arizona. Grows in Western Texas, and thence westward to Southern California. In our borders, it is usually only a shrub; but in Mexico it grows 20 to 30 feet high, and on account of its spiny branches is used for hedges and fences.

GUTTIFERÆ.

No. 14. *Clusia flava*.—South Florida. A West Indian tree, said to have been found in Florida, but not recently observed.

TERNSTROMIACEÆ.

No. 15. *Gordonia Lasianthus*, L.—Loblolly Bay.—Southern States. A tree 30 to 50 feet high, growing in swamps near the sea-coast from North Carolina to Florida and Louisiana. The leaves are evergreen; the flowers showy white, and sweet-scented. The bark is much employed in tanning as a substitute for oak-bark.

No. 16. *Gordonia pubescens*, L'H.—Mountain Bay.—Southern States. A small tree rarely over 30 feet high, found in Georgia and Florida, and quite rare. It has been introduced into cultivation, and is hardy as far north as Philadelphia. When in bloom, it is beautiful, and it flowers continuously for two or three months.

TILIACEÆ.

The Tilias in Europe are called Lime trees, or Linn. Our species are commonly called Basswood. They are large trees, and have a wide range, being found probably in every State east of the Rocky Mountains. It is, however, not abundant, except in some localities. The wood is white and soft, and is employed to some extent in the manufacture of furniture, &c.

No. 17. *Tilia Americana*, L.—Basswood; Linden. Eastern United States.

No. 18. *Tilia heterophylla*, Vent.—White Basswood. Eastern United States.

No. 19. *Tilia pubescens*, Ait.—White Basswood. Eastern United States.

ZYGOPHYLLACEÆ.

No. 20. *Guaiacum sanctum*, L.—Lignum Vitæ.—South Florida. A small tree, quite rare in South Florida, but common in the West Indies. It is very similar to, and has the same properties as the *G. officinale* of the West Indies, which furnishes the gum resin called guaiacum, which is a common stimulative aromatic medicine. The wood is much heavier than water.

ZANTHOXYLACEÆ.

No. 21. *Zanthoxylum Americanum*, Mill.—Prickly Ash; Toothache Tree.—Northeastern United States. A shrub or small tree. The bark is very hot and aromatic, and is somewhat used medicinally.

No. 22. *Zanthoxylum Carolinanum*, Lam.—Southern Prickly Ash.—Southern States. A small tree found from South Carolina to Florida and westward. The bark is aromatic and tonic. The young stems are spiny, and the old ones more or less covered with tubercles, which have developed from the spines.

No. 23. *Zanthoxylum Floridanum*, Nutt.—Satin Wood.—South Florida.

No. 24. *Zanthoxylum Pterota*, **H. B. K.**—**False Iron Wood; Yellow Wood.**—**The Gulf States.** A small shrubby tree occurring from Florida to Texas. The wood is yellow and close-grained.

No. 25. *Ptelea trifoliata*, **L.**—**Hop tree.**—**Eastern United States.** This is seldom more than a tall shrub. The fruit, a wafer like seed, grows in clusters, is a bitter tonic, and has been used as a substitute for hops.

No. 26. *Ptelea angustifolia*, Benth.—Narrower leaved than the preceding.—Rocky Mountains; Texas to California.

SIMARUBIACEÆ.

No. 27. *Simaruba glauca*, DC.—Quassia; Bitter-wood.—South Florida. Found in South Florida by Dr. Blodgett. It occurs in the West Indies with another species, the *Simaruba amara*, the bark of which is medicinal, and possesses the same properties as quassia.

BURSERACEÆ.

No. 28. *Bursera gummifera*, Jacq.—West India Birch; Gummo Limbo.—South Florida. The largest of South Florida trees, abounding in gum.

No. 29. *Amyris Floridana*, Nutt.—Torch Wood.—South Florida. Mostly a shrub, but becoming a small evergreen and elegant tree.

OLACINEÆ.

No. 30. *Ximena Americana*, L.—Hog Plum.—South Florida. Mostly shrubby, but sometimes 20 feet high. It bears a drupe the size of a plum, which is yellow and pleasant tasted.

MELIACEÆ.

No. 31. *Melia Azederach*, L.—Pride of India; Bread Tree.—Naturalized in Southern States. A native of Persia, but quite freely naturalized in some parts of the South. It is there one of the commonest ornamental trees. The wood is of a reddish color, solid, durable and taking a beautiful finish.

ILICINEÆ.

No. 32. *Ilex opaca*, Ait.—Evergreen Holly.—Southern States. In favorable localities, this tree attains a pretty large size, frequently 40 feet high, and 12 to 15 inches diameter. The wood is very heavy, compact, and fine grained. It is employed in some parts of cabinet-work. It very closely resembles the European Holly.

No. 33. *Ilex Dahoon*, Walt.—Dahoon Holly.—Southern States.

No. 34. *Ilex decidua*, Walt.—Deciduous Holly.—Southern States.

No. 35. *Ilex monticola*, Gr.—Holly.—Southern States.

CELASTRINEÆ.

No. 36. *Schæfferea frutescens*, Jacq.—Crab-wood; False Box.—South Florida. A small tree of South Florida; the wood is close and fine-grained, and is said to be exported from the West Indies as a kind of box-wood.

No. 37. *Euonymus occidentalis*, Nutt.—California Spindle Tree.—California.

No. 38. *Euonymus atropurpureus*, Jacq.—Waahoo.—Southern and Western States.

RHAMNACEÆ.

No. 39. *Frangula Caroliniana*, Gr.—Alder Buckthorn.—Virginia and southward.

No. 40. *Frangula Purshiana*, DC.—Oregon Buckthorn.—Western coast.

No. 41. *Frangula Californica*, Gr.—California Coffee-tree.—Western coast. This much resembles the *F. Caroliniana*. In California, the berries of this species have been employed to some extent as a substitute for coffee. Some persons recommend it; others have been made sick by its use.

No. 42. *Ceanothus thyrsiflorus*, Esch.—California Lilac.—Western coast. One of the most showy shrubs or small trees of California.

No. 43. *Ceanothus divaricatus*, Nutt.—California.

No. 44. *Zizyphus obtusifolias*, Gr.—Texas Jujube-tree.—Texas and westward.

No. 45. *Scutia ferrea*, Brong.—South Florida.

SAPINDACEÆ.

No. 46. *Æsculus glabra*, Wild.—Ohio Buckeye.—Tennessee and Western States. This tree attains, in favorable situations, 20 to 30 feet height, and is much in use as an ornamental tree. It is not found wild east of the Alleghany Mountains; its favorable localitiy being the banks of the western rivers, in Ohio, Illinois, and Kentucky. The wood is light, soft, and useless. The nuts are said to be poisonous to cattle eating them.

No. 47. *Æsculus flava*, Ait.—Sweet Buckeye.—Southern States. This tree prevails more to the southward than the Ohio Buckeye. It is abundant in the mountainous districts of North and South Carolina and Georgia. In favorable situations it frequently attains a height of 50 to 60 feet, and the trunk a diameter of 2 to 3 feet. The flowers are of a light agreeable yellow and quite ornamental. The wood is soft and perishable.

No. 48. *Æsculus Pavia*, L.—Red Buckeye.—Southern States. This species has nearly the same range as the preceding, but is usually only a shrub of 8 to 10 feet height; sometimes, however, becoming a small tree.

No. 49. *Æsculus Californica*, Nutt.—California Buckeye.—California. This is the only buckeye of the Pacific coast. It forms a low, spreading, bushy tree from 15 to 20 feet high.

No. 50. *Ungnadia speciosa*, Endl.—Spanish Buckeye.—Texas and westward. This is a large shrub or small tree, a native of Texas and New Mexico. The chestnut-like fruits have an agreeable, sweet taste, but are strongly emetic. The foliage resembles that of the hickory, (*Carya.*)

No. 51. *Sapindus marginatus*, Wild.—Soap Berry.—Southern States. This tree varies from 20 to 40 feet in height. It occurs along the coast in Georgia and Florida, also in Arkansas and Texas. The berries are smaller than those of the next species, but, like that, the black hard nuts of the berries are sometimes strung for beads and crosses.

No. 52. *Sapindus saponaria*, L.—White Wood.—South Florida. This species was found by Dr. Chapman in South Florida. In the West Indies, the berries and the roots are used as a substitute for soap. The berries are also used to intoxicate fish.

No. 53. *Hypelate paniculata*, Don.—Madeira Wood.—South Florida. A small tree found in South Florida. The wood is very like mahogany, and is highly valued.

No. 54. *Acer saccharinum*, Wang.—Sugar Maple; Hard Maple.—Eastern United States. The well-known Sugar Maple, from the sap of which in the Northern States and in Canada large quantities of sugar and sirup are made annually. It is one of the noblest of American trees, both for the value of its wood and the beauty of its form and foliage. It is much employed as an ornamental tree.

No. 55. *Acer saccharinum*, Wang., var. *nigrum*, Gr.—Black Sugar Maple.—Eastern United States. This variety differs little from the common form except in a darker wood.

No. 56. *Acer dascycarpum*, Ehrh.—Silver-leaf Maple.—Eastern United States. One of the most beautiful of maples; much used as a shade-tree on account of its rapid growth and beautiful foliage.

No. 57. *Acer rubrum*, L.—Red Maple.—Eastern United States. More compact in form and less rapid in growth than the preceding, but, like it, a favorite for street-planting and ornament.

No. 58. *Acer Pennsylvanicum*, L.—Striped-bark Maple.—Northeastern United States. A small tree, the young bark with longitudinal stripes of green and black. Rare and little known outside of the Northeastern States.

No. 59. *Acer macrophyllum*, Pursh.—Oregon Maple.—California and Oregon. This occurs in the mountainous districts of California and Oregon. In Oregon, it attains a large size, and the wood abounds in that peculiarity of grain which is called Bird's-eye and Curled Maple. For cabinet purposes, it is thought to be equal to mahogany.

No. 60. *Acer circinatum*, Pursh.—Vine Maple.—Oregon and Washington Territory. This species has a low and frequently reclining or prostrate trunk, which sends forth branches, at first upright, then bending down to the ground, and forming almost impenetrable thickets.

No. 61. *Acer grandidentatum*, Nutt.—Great-toothed Maple.—California and Oregon. A small tree or shrub of the Rocky Mountains.

No. 62. *Negundo aceroides*, Moench.—Box Elder.—Eastern United States. This is a fine ornamental tree, of rapid growth, not commonly growing more than 20 to 30 feet high. It is rare east of the Alleghanies, but found along all the rivers of the West, reaching into Kansas, Missouri, and Nebraska, and even northward into Minnesota and the British possessions. The sap contains a large amount of sugar. The wood is fine and close-grained, and has been used in cabinet work.

No. 63. *Negundo Californica*, T. & G.—California Box Elder.—California. This species is confined to the Pacific coast. It does not seem to differ greatly from the preceding species.

No. 64. *Staphylea trifoliata*, L.—Bladder Tree.—Eastern United States. A large shrub or small tree 10 to 15 feet high, with trifoliate leaves and peculiar 3-lobed bladdery pods.

ANACARDIACEÆ.

No. 65. *Rhus typhina*, L.—Staghorn Sumac.—Eastern United States. The Sumacs are large shrubs or small trees, mostly with pinnate leaves. The leaves and young twigs are employed in tanning, and are thought to be equal in strength to those of the Sicilian Sumac.

No. 66. *Rhus glabra*, L.—Smooth Sumac.—Eastern United States.

No. 67. *Rhus microphylla*, Eng.—Small-leaved Sumac.—Texas and Southwest.

No. 68. *Rhus copallina*, L.—Dwarf Sumac.—Eastern United States.

No. 69. *Rhus Metopium*, L.—Coral Sumac.—South Florida. This grows in South Florida, where it attains a height of 20 to 30 feet. It is very poisonous. In the West Indies it is called Mountain Manchineel and Burnwood.

No. 70. *Rhus venenata*, DC.—Poison Sumac.—Eastern United States.

No. 71. *Rhus integrifolia*, Nutt.—One-leaved Sumac.—South California. This species and the succeeding do not have pinnate leaves. They are found in Southern California. The red berries of this species are used by the Indians to make a cooling acid drink.

No. 72. *Rhus Laurina*, Nutt.—Laurel Sumac.—South California. A low spreading tree, much branched and very leafy, and exhaling to a considerable distance an aromatic odor. The flowers are somewhat showy, and the plant would be fine in cultivation.

No. 73. *Pistacia Mexicana*, H. B. K.—Mexican Pistacia-tree.—Texas.

No. 74. *Schinus molle*, L.—Pepper Tree.—Southwestern United States. Cultivated as an ornamental tree in California and in Mexico. It is probably introduced. The berries have the taste of black pepper.

VITACEÆ.

No. 75. *Vitis æstivalis*, Michx.—Summer Grape.—Eastern United States.

No. 76. *Vitis cordifolia*, Michx.—Winter or Frost Grape.—Eastern United States.

LEGUMINOSÆ.

No. 77. *Robinia Pseudacacia*, L.—Common Locust.—Pennsylvania and southward. Hardly found north of the fortieth degree of latitude except in cultivation. It is chiefly found in the Alleghanies and the mountainous parts of Kentucky and Tennessee. It is a beautiful tree, attaining a height of 50 feet and upward. The wood is hard, compact, and very durable, much used in ship-building.

No. 78. *Robinia viscosa*, Vent.—Clammy Locust.—Virginia and southward. A smaller tree than the preceding, and much more rare, being confined to the mountains of Georgia and North Carolina.

No. 79. *Robinia Neo-Mexicana*, Gray.—New Mexican Locust.—New Mexico and Arizona. A small tree, rarely exceeding 20 feet. Very thorny. Grows in stony ravines at the foot of mountains in New Mexico and Arizona.

No. 80. *Olneya tesota*, Gray.—Palo de Hierro.—New Mexico and Arizona.

No. 81. *Piscidia Erythrina*, L.—Jamaica Dogwood.—South Florida. A tolerably large tree of South Florida; also grows in the West Indies. Its blossoms resemble those of the Locust. The wood is heavy, coarse-grained, and durable.

No. 82. *Cladrastris tinctoria*, Raf.—Yellow Wood.—Tennessee and Kentucky. This is one of the handsomest flowering-trees of the Locust kind. It grows chiefly in the mountainous regions of Kentucky and Tennessee. The wood is yellow, and has been used in domestic dyeing The tree rarely exceeds 40 feet in height and 1 foot in diameter. It is well worthy of cultivation.

No. 83. *Sophora affinis*, T & G.—Texas and Southwest.

No. 84. *Sophora speciosa*, Benth.—Texas and Southwest. Our two Sophoras are small trees of Texas and New Mexico, seldom over 6 inches in diameter. They produce an abundance of showy flowers very early in the season. The *Sophora speciosa* has evergreen leaves, and beautiful red beans, which are said to be poisonous.

No. 85. *Gymnocladus Canadensis*, Lam.—Kentucky Coffee-tree.—Eastern United States. A tall, large, and handsome tree, rare in Western New York, Pennsylvania, and the States north of the Ohio River; more common in Kentucky and southwestward. The wood is very compact and close-grained, and valuable for cabinet-work. The large beans of the pods have been used for coffee.

No. 86. *Gleditschia triacanthos*, L.—Honey Locust.—Eastern United States. This is a large and handsome tree; the trunk and branches generally beset with long and formidable spines, on which account it has been employed as a hedge-plant. The long pods contains a sweetish pulp, and have been used in fermenting a kind of beer, but are of no practical value. The wood is heavy, and affords excellent fuel, but is not considered durable as a timber. The tree is rare in the Atlantic States, but rather common west of the Alleghanies, in Tennessee, Kentucky, and the tributaries of the Ohio and Mississippi.

No. 87. *Gleditschia monosperma*, Walt.—Water Locust.—Illinois and southward. This is a smaller tree than the preceding, growing in swamps in the Southern States and in the vicinity of the Ohio River. The pods are short, roundish, and only one-seeded. The tree is thorny, like the Honey Locust.

No. 88. *Cercidium floridum*, Torr.—Green-bark.—Western Texas and Arizona. This is the Palo Verde of the Mexicans and the Green-barked Acacia of American travelers. The bark is smooth and green on the young trees. It is a small, wide-spreading tree, with many branches, rarely seen a foot through, and 20 to 30 feet high.

No. 89. *Parkinsonia aculeata*, L.—Jerusalem Thorn.—Western Texas and Arizona. Mostly a shrub; quite ornamental, and frequent in cultivation in the region bordering on Mexico.

No. 90. *Parkinsonia microphylla*, Torr.—Western Texas and Arizona.

No. 91. *Cercis Canadensis*, L.—Redbud or Judas Tree.—Eastern United States. The Redbuds are small trees; very ornamental. This species is frequent east of the Mississippi. The next is found principally on the Pacific coast.

No. 92. *Cercis occidentalis*, Torr.—Western Redbud.—Western United States.

No. 93. *Prosopis glandulosa*, T. & G.—Mesquit.—Texas to California. A scrubby, small tree, seldom more than 25 to 30 feet high; sometimes constituting extensive forests. It produces an abundance of bean-like pods, which contain a sweet pulp. Both beans and pulp are eaten by Indians and often by whites, but they are used chiefly as food for horses, which eat them with avidity. The wood is very hard and durable, dark brown, and resembles mahogany. Fences made of this timber are very durable. The wounded bark in spring exudes a gum of the same quality as gum arabic.

No. 94. *Strombocarpus pubescens*, Gr.—Screw-bean.—Texas and westward. This tree is very similar to the preceding, but of smaller size. The pods are two to three inches long, and twisted like a screw. They are eaten by the Colorado Indians, powdered to a coarse meal, and made into a kind of bread. They are also good food for horses.

No. 95. *Leucæna retusa*, Gr.—Texas and westward.

No. 96. *Acacia Farnesiana*, Willd.—Texas and westward.

No. 97. *Pithecolobium Unguis-Cati*, Benth.—Cat's-claw.—South Florida. In South Florida, mostly a shrub, rarely a small tree. The bark has medicinal properties.

ROSACEÆ.

No. 98. *Prunus Americana*, Marsh.—Wild Yellow or Red Plum.—Eastern United States. This is the common wild plum of the country east of the Rocky Mountains, from Mississippi to Minnesota. In the valley of the Mississippi, and particularly southwestward, the two next named species also occur.

No. 99. *Prunus rivularis*, Scheele.—Wild Plum.—Mississippi Valley and westward.

No. 100. *Prunus Chicasa*, Michx.—Chickasaw Plum.—Southeastern United States.

No. 101. *Prunus umbellata*, Ell.—Small Wild Plum.—South Carolina and southward. A small purple or black plum, sour and bitter, growing from South Carolina to Florida.

No. 102. *Prunus Pennsylvanica*, L.—Wild Red Cherry.—North-Eastern United States. A small tree, or often a shrub, with sour, unpleasant fruit.

No. 103. *Prunus serotina*, Ehrh.—Wild Black Cherry.—Eastern United States. A fine, large tree, of wide range, frequent in the Northern and Western States, and along the Alleghany Mountains in the Southern States. The wood is compact, fine-grained, and highly esteemed for cabinet-work. The fruit is small, rather sweet and pleasant when fully ripe.

No. 104. *Prunus Virginiana*, L.—Choke-cherry.—Eastern United States.

No. 105. *Prunus Caroliniana*, Ait.—Mock Orange.—North Carolina and southward. A small tree with evergreen leaves, growing from North Carolina to Florida and in the Gulf States. It closely resembles the Cherry Laurel of Europe. It is a beautiful tree for cultivation, but probably would not bear a northern climate.

No. 106. *Prunus demissa*, Walp.—Rocky Mountain Choke-cherry.—Rocky Mountains and California.

No. 107. *Prunus Andersonii*, Gr.—Desert Plum.—California and Nevada.

No. 108. *Prunus ilicifolia*, Walp.—Holly-leaved Cherry.—California.

No. 109. *Prunus mollis*, Walp.—Oregon. This is the principal wild cherry of Oregon and the northwestern coast. It grows to the height of 20 to 30 feet. The fruit is astringent and unpleasant.

No. 110. *Nuttallia cerasiformis*, T. & G.—California.

No. 111. *Adenostoma sparsifolium*, Torr.—Chimisell.—California.

No. 112. *Cercocarpus ledifolius*, Nutt.—Mountain Mahogany.—Rocky Mountains. A low, spreading tree, not usually over 10 to 15 feet high, but sometimes 40 feet high, and 2½ feet thick. The leaves are evergreen; the wood is a dark red, like mahogany, extremely compact and heavy. It is frequent on the mountains of Utah, Nevada, and California.

No. 113. *Cercocarpus parvifolius*, Nutt.—Small Mountain Mahogany.—California. A much smaller tree or shrub than the preceding; the wood quite similar.

No. 114. *Pyrus coronaria*, L.—American Crab Apple.—Eastern United States. The common wild crab apple of the United States, growing in glades and frequently forming extensive thickets. The fruit is variable, but seldom palatable or serviceable. It is used, however, in new portions of the country for preserves or for making cider.

No. 115. *Pyrus angustifolia*, Ait.—Narrow-leaved crab.—Pennsylvania southward and westward. Perhaps only a variety of the preceding, with narrower leaves and rather smaller fruit.

No. 116. *Pyrus Americana*, DC.—American Mountain Ash.—Northeastern United States. A small tree growing in swamps and mountain woods, sparingly in the Alleghany Mountains, most common in New England and northward. It is frequently seen in cultivation, and much resembles the European Mountain Ash. The clusters of bright-red berries are very ornamental, and remain on the tree until winter.

No. 117. *Pyrus rivularis*, Doug.—Oregon Crab Apple.—Oregon and Rocky Mountains. This is a small tree, ranging from California northward into Alaska. The fruit is of the size of a cherry, of an agreeable flavor, and used, particularly in Alaska, by the natives of the country for food.

No. 118. *Crataegus spathulata*, Michx.—Wild Thorn.—Virginia and southward. Of wild thorns, we have numerous species, most of which are small and shrubby. About twelve species and varieties of the country east of the Rocky Mountains may be counted as small trees, and two of the Rocky Mountains and western coast.

No. 119. *Crataegus apiifolia*, Michx.—Wild Thorn.—Virginia and southward.

No. 120. *Crataegus cordata*, Ait.—Washington Thorn.—Virginia and southward.

No. 121. *Crataegus arborescens*, Ell.—Wild Thorn.—Southern States.

No. 122. *Crataegus coccinea*, L.—Scarlet-fruited Thorn.—Eastern United States.

No. 123. *Crataegus tomentosa*, L.—Black or Pear Thorn.—Eastern United States.

No. 124. *Crataegus tomentosa*, L., var. *punctata*, Gr.—Black Thorn.—Eastern United States.

No. 125. *Crataegus tomentosa*, L., var. *mollis*, Gr.—Wild Thorn.—Eastern United States.

No. 126. *Crataegus Crus-galli*, L.—Cockspur Thorn.—Eastern United States.

No. 127. *Crataegus aestivalis*, T. & G.—Wild Hawthorn.—Southern States.

No. 128. *Crataegus flava*, Ait.—Summer Haw.—Virginia and southward.

No. 129. *Cratægus glandulosa*, Michx.—Wild Hawthorn.—Virginia and southward.

No. 130. *Cratægus rivularis*, Doug.—Western Hawthorn.—Rocky Mountains.

No. 131. *Cratægus sanguinea*, Pallas.—Oregon Thorn.—Oregon.

No. 132. *Photinia arbutifolia*, Lindl.—Laurel Hawthorn.—California. A beautiful evergreen shrub or small tree of the Pacific coast. It sometimes attains the height of 20 or 25 feet and a thickness of trunk of 12 or 15 inches.

No. 133. *Amelanchier Canadensis*, T. & G.—Service or June Berry.—Eastern United States. Usually a small tree, but sometimes becoming 30 to 40 feet high, with a diameter of 10 or 12 inches. It is found mostly by the banks of mountain-streams. There are several varieties.

No. 134. *Amelanchier alnifolia*, Nutt.—Service Berry.—Rocky Mountains. This is usually a shrub; in Oregon and Washington Territory, it is said to be a small tree, yielding abundance of berries, which are largely employed as food by the Indians.

HAMAMELACEÆ.

No. 135. *Liquidambar styraciflua*, L.—Sweet Gum or Bilsted.—Eastern United States. A large and beautiful tree, with singular star-like leaves, somewhat resembling the maple. It grows in the Atlantic States in rich, low woods; also in the Mississippi Valley, but not far north of the Ohio. The wood is compact and fine-grained, but not durable. It is a fine ornamental tree, and deserving of cultivation.

RHIZOPHORACEÆ.

No. 136. *Rhizophora Mangle*, L.—Red Mangrove.—South Florida. Commonly a low, spreading tree in South Florida, also in Louisiana and on the coast of Texas. On the Thousand Islands, it attains a height of 40 to 60 feet. All the low keys along the coast are covered by this tree. It sends down roots from its germinating fruits, which take root upon reaching the earth, and thus forms an impenetrable thicket like the Banyan tree of India.

COMBRETACEÆ.

No. 137. *Conocarpus erectus*, Jacq.—White Button Wood.—Florida. A small tree of the West Indies and South Florida. It furnishes almost the only fuel used in South Florida, and extends north as far as Ancelote Keys.—(Dr. Chapman.)

No. 138. *Laguncularia racemosa*, Gært.—Black Button Wood.—South Florida. Found by Dr. Chapman in South Florida; a small tree everywhere; is a mere shrub, except among the Thousand Islands and north of Cape Sable, where it forms a large tree.

MYRTACEÆ.

No. 139. *Eugenia buxifolia*, Wild.—Iron Wood.—South Florida. The Eugenias are in Florida small trees, reaching 20 to 25 feet in height. They belong to the Myrtle family, and the flowers of some species are very fragrant. The wood is close-grained, hard, and applicable to cabinet-work.

No. 140. *Eugenia monticola*, DC.—Iron Wood.—South Florida.

No. 141. *Eugenia procera*, Poir.—Iron Wood.—South Florida.

No. 142. *Eugenia dichotoma*, DC.—Stopper Wood.—South Florida.

No. 143. *Psidium pyriforme*, L.—Guava.—South Florida. The Guava is a well-known fruit in the West Indies, where it is highly esteemed, and eaten either raw or formed into preserves. Dr. Chapman found the tree extensively naturalized at Tampa Bay, Florida.

CACTACEÆ.

No. 144. *Cereus giganteus*, Eng.—Tree Cactus.—Western Texas and Arizona. The specimens for this order are from Southern Arizona, where they are striking and characteristic features of the country. The *Cereus giganteus* grows 50 to 60 feet in a straight column, and finally divides into several naked-looking branches. The wood of this and other large Cacti presents a singular net-work of fibers in distinct layers.

No. 145. *Cereus Thurberi*, Eng.—Thurber's Cactus.—Western Texas and Arizona.

No. 146. *Opuntia arborescens*, Eng.—Tree Opuntia.—Western Texas and Arizona.

ARALIACEÆ.

No. 147. *Aralia spinosa*, L.—Angelica Tree or Hercules's Club.—Eastern United States.

CORNACEÆ.

No. 148. *Cornus florida*, L.—Flowering Dogwood.—Eastern United States. This is usually a small tree, but sometimes acquires a height of 40 or 50 feet, and a diameter of trunk of 1½ feet. It flowers in spring before the full development of the leaves, and then presents a beautiful appearance. It deserves to be more generally cultivated.

No. 149. *Cornus Nuttallii*, Aud.—White Dogwood.—California and Oregon. This species, which is confined to the Pacific coast, has rather larger flowers than the preceding, and is perhaps more showy. The wood of both is hard and valuable. Grows sometimes 50 or 60 feet high.

No. 150. *Cornus pubescens*, Nutt.—Western Dogwood.—California and Oregon. This rarely becomes a small tree, 25 to 30 feet high, on the Pacific coast. We have five or six other species of dogwood which do not attain tree size.

No. 151. *Garrya Fremontii*, Torr.—Tassel-tree.—Oregon and California. The Garryas are mostly shrubs, though under favorable circumstances the *Garrya elliptica* gains a height of 20 to 30 feet.

No. 152. *Garrya elliptica*, Lindl.—Satin Tassel-tree.—California.

No. 153. *Nyssa multiflora*, Wang.—Black or Sour Gum; Pepperidge.—Eastern United States. A middle-sized tree, growing from Massachusetts to Illinois and southward. The fibers of the wood are so interwoven that it is almost impossible to split; hence it is used for wheel-hubs, rollers, and cylinders.—(Bryant.) It is quite ornamental in cultivation.

No. 154. *Nyssa aquatica*, L.—Water Tupelo.—Southern States. This species grows in low wet ground, chiefly in the Southern States, but is found also in New Jersey and Pennsylvania. The wood is very tough, and has been used in the manufacture of wooden bowels, &c.

No. 155. *Nyssa uniflora*, Walt.—Large Tupelo.—Virginia and southward. This is the largest tree of the genus. It is confined to the Southern States, growing in swamps. It bears a dark-blue plum-like fruit nearly an inch long. The wood is soft and extremely light. The roots are also extremely light and soft, and have been used as a substitute for cork. The wood is only used to make bowls and trays.

No. 156. *Nyssa capitata*, Walt.—Ogeechee Lime.—Southern United States. This species is found in swamps in Georgia and Florida and westward near the coast. It bears an oblong, red, plum-like fruit, which is agreeably acid, and can be employed as a substitute for the lemon The tree is small and the wood without value.

CAPRIFOLIACEÆ.

No. 157. *Sambucus glauca*, Nutt.—California Elder.—California and Rocky Mountains. This species of elder in California forms a low tree, sometimes 30 feet high, with a stem 2 feet in diameter. Indians and birds eat the berries.

No. 158. *Viburnum prunifolium*, L.—Black Haw.—Eastern United States. The haws are small trees or large shrubs, with smooth glossy leaves and handsome flowers. They are worthy of cultivation.

No. 159. *Viburnum Lentago*, L.—Sweet Viburnum or Sheepberry.—Eastern United States.

No. 160. *Viburnum obovatum*, Walt.—Wild Haw.—Virginia and southward.

RUBIACEÆ.

No. 161. *Cephalanthus occidentalis*, L., var. *Californica*.—Button bush.—California. This is seldom more than a shrub; but in California it sometimes grows 25 to 30 feet high, with a trunk 12 to 20 inches in diameter.

No. 162. *Guettarda Blodgettii*, Suttle.—South Florida.

No. 163. *Randia clusiæfolia*, Chap.—Seven-years Apple.—South Florida.

No. 164. *Pinckneya pubens*, Michx.—Georgia Bark.—South Carolina to Florida. A small tree in the lower districts of Georgia and in Florida, rarely exceeding the height of 25 feet and a diameter of 6 inches. The bark is extremely bitter, and has been employed in the treatment of intermittent fevers. It is closely related botanically to the Cinchona, which furnishes the Peruvian bark of commerce.

ERICACEÆ.

No. 165. *Vaccinium arboreum*, Marshall.—Farkleberry.—Virginia and southward. A shrub or small tree sometimes 20 feet high, growing from Virginia and Southern Illinois southward.

No. 166. *Oxydendrum arboreum*, DC.—Sourwood or Sorrel-tree.—Pennsylvania and southward. This tree grows chiefly in the mountainous districts of the Alleghanies from Pennsylvania southward. In fertile valleys, at the foot of the mountains, in North Carolina and Tennessee, it attains a height of 50 feet. The common name sour-tree is derived from the acidity of its leaves. The flowers are white, and in spikes 5 or 6 inches long. They are very ornamental, and begin to be produced when the tree is 5 or 6 feet high.

No. 167. *Kalmia latifolia*, L.—Calico-bush or Mountain Laurel.—Pennsylvania and southward. A beautiful evergreen shrub, sometimes attaining the size of a small tree. It is very ornamental and deserving of cultivation.

No. 168. *Rhododendron maximum*, L.—Rose Bay or Great Laurel.—Pennsylvania and southward. Like the preceding, an evergreen shrub of great beauty. It has been much improved by cultivation.

No. 169. *Rhododendron Californicum*, Hook.—California Rhododendron.—Pacific coast.

No. 170. *Arbutus Menziesii*, Pursh.—Madrone-tree.—California and Oregon.

No. 171. *Arbutus Texana*, Buckl.—This species or variety grows in Texas. It is mostly a large shrub; sometimes, however, becoming 25 feet high and 8 or 10 inches in diameter. The leaves are smaller and the flowers less panicled than in the California species. The timber is said to be almost imperishable.

No. 172. *Arctostaphylos glauca*, Lindl.—Manzanita.—Oregon and California. There are several species of this genus on the western coast, mostly shrubs or small trees, which have been much confused. The specimen under this number is from Southern California, and has a large drupe-like fruit, with a consolidated nut. These berries are pleasant to the taste, and much employed as food by the Indians of that region.

No. 173. *Arctostaphylos tomentosa*, Doug.—Manzanita.—California and Rocky Mountains.

No. 174. *Arctostaphylos pungens*, H. B. K.—Manzanita.—California and Rocky Mountains.

STYRACACEÆ.

No. 175. *Halesia diptera*, L.—Snowdrop-tree.—Georgia and Florida. The Snowdrop-trees are found in the Southern States from the Ohio River southward, near the Alleghanies, and on river banks in Georgia and Florida. They are usually smallish trees, but sometimes grow 40 or 50 feet high, and 1½ to 2 feet in diameter. They are very desirable for ornamental trees, producing a profusion of white bell-shaped flowers, even when quite small.

No. 176. *Halesia tetraptera*, L.—Silverbell-tree.—Virginia and southward.

No. 177. *Symplocos tinctoria*, L'Her.—Horse Sugar or Sweet-leaf.—Virginia and southward. A small tree with oblong evergreen leaves, and clustered racemes of small white flowers. It grows in low, damp woods and pine barrens in North Carolina, Georgia, and Florida, and attains a height of 12 to 20 feet, with a diameter of 8 to 10 inches. It is one of the most beautiful trees of the southern forest.—(Nuttall.)

CYRILLACEÆ.

No. 178. *Cyrilla racemiflora*, Walt.—Iron-wood.—North Carolina and southward.

No. 179. *Cliftonia ligustrina*, Banks.—Buckwheat-tree.—Georgia and southward. An elegant small tree, growing from 10 to 20 feet high, of about the same range as the preceding. It is evergreen, and exceedingly ornamental when in flower. After flowering, the tree presents a curious appearance, from the abundance of triangular winged capsules, resembling buckwheat, from which the tree receives its popular name.

EBENACEÆ.

No. 180. *Diospyros Virginiana*, L.—Persimmon.—Eastern United States. A well-known tree, most common in the Southern States, but growing as far north as New York. It grows from 30 to 60 feet high, with a very hard fine-grained wood, which has been used for various purposes. It bears a plum-like fruit an inch or more in length, which when fully ripe is edible and palatable.

No. 181. *Diospyros Texana*, Schul.—Black Persimmon.—Western Texas. This is called Sapote-pieto by the Mexicans and Black Persimmon by the Americans. It is a shrub or middle-sized tree, often with a black, ebony-like core. The fruits are black, and of the size of a cherry and larger, melting, and very sweet.—(Dr. Lindheimer.)

SAPOTACEÆ.

No. 182. *Sideroxylon pallidum*, Spreng.—Mastic.—South Florida. A middle-sized tree of South Florida called Mastic, probably from the production of a gum resembling mastic.

No. 183. *Dipholis salicifolia*, A. DC.—South Florida.

No. 184. *Chrysophyllum microphyllum*, Jacq.—Golden-leaf.—South Florida. A small tree of the West Indies, found by Dr. Chapman last fall in South Florida. The leaves have a beautiful, golden, satin-like surface on the under side.

No. 185. *Mimusops Sieberi*, A. DC.—Naseberry.—South Florida. This is one of the trees called Naseberry in the West Indies. It is common in South Florida, where it becomes a large tree. Dr. Chapman invariably found the large trunks to be hollow. The fruit is delicious and highly flavored.

No. 186. *Bumelia lycioides*, Gært.—Iron-wood.—Kentucky and southward. The Bumelias are shrubs or small trees, of no special value.

No. 187. *Bumelia parvifolia*, A. DC.—Iron-wood.—South Florida.

No. 188. *Bumelia lanuginosa*, Pers.—Iron-wood.—Southern States.

No. 189. *Bumelia tenax*, Willd.—Iron-wood.—Southern States.

No. 190. *Bumelia reclinata*, Vent.—Iron-wood.—Texas and westward.

THEOPHRASTACEÆ.

No. 191. *Jacquinia armillaris*, L.—Currant-trees.—South Florida. A small tree of South Florida and the West Indies. The wood is curiously grained.

MYRSINACEÆ.

No. 192. *Myrsine Floridana*, A. DC.—South Florida.—Mostly a shrub, rarely a small tree.

No. 193. *Ardisia Pickeringii*, T. & G.—South Florida.—Mostly a shrub, but on the keys a small tree. It is an evergreen tree, with laurel-like leaves, and panicles of showy-white purple-tinged flowers.

BIGNONIACEÆ.

No. 194. *Catalpa bignonioides*, Walt.—Catalpa.—Southern States. A tree well known in cultivation, and hardy as far north as latitude 41°. It is native in the Southern and Southwestern States and in Southern Illinois and Indiana. It attains a height of 50 or 60 feet, and a diameter of 1½ to 2 feet. The leaves are large, and the flowers showy, and when in bloom the tree is extremely ornamental. The wood is light, but of a fine texture, and capable of receiving a fine polish. It is said to be very durable.

No. 195. *Chilopsis linearis*, DC.—Texas and Arizona. Usually a shrub, but sometimes attaining a height of 25 feet. It has long willow-like leaves, and is very ornamental when in flower.

No. 196. *Tecoma radicans*, Juss.—Trumpet-vine.—Southern States. This beautiful woody vine sometimes acquires a woody trunk of a foot in diameter or more.

VERBENACEÆ.

No. 197. *Citharexylum villosum*, Jacq.—Fiddle-wood.—South Florida. Rarely a small tree, of no economic value.

No. 198. *Avicennia tomentosa*, Jacq.—Black Mangrove.—South Florida. This and the next species are called Black Mangrove, observed by Dr. Chapman at Cedar Keys and the Thousand Islands. They are low evergreen trees, forming impenetrable thickets on the muddy shores of the sea.

No. 199. *Avicennia oblongifolia*, Chap.—Black Mangrove.—South Florida.

Order BORRAGINACEÆ.

No. 200. *Cordia bullata*, L.—South Florida.

No. 201. *Ehretia Buerreria*, L.—South Florida.

No. 202. *Ehretia elliptica*.—Texas.—Mostly shrubby, but sometimes a tree 2 feet in diameter; fruit an orange-yellow berry, of the size of a pea; much liked by children and birds. The evergreen rough leaves are used to rub and destroy eruptions of the skin.—(Dr. Lindheimer.)

OLEACEÆ.

No. 203. *Olea Americana*, L.—Devil-wood; American Olive.—Southern States. This is a small evergreen tree, with thick, leathery leaves, and small, white, fragrant flowers. It is related to the olive-tree of the eastern world, but its fruit has no value. It is impossible to split, and hence the vulgar name of Devil-wood.

No. 204. *Chionanthus Virginica*, L.—Fringe-tree.—Middle and Southern States.

No. 205. *Fraxinus Americana*, L.—White Ash.—Eastern United States. A large and valuable tree ranging over the eastern portion of the United States. The wood is tough and elastic, and much employed in various manufactures. It is a handsome and ornamental tree.

No. 206. *Fraxinus pubescens*, Lam.—Red Ash.—Eastern United States. A smaller tree than the preceding, perhaps more common. The wood is said to be equally as valuable as that of the White Ash.

No. 207. *Fraxinus viridis*, Michx.—Green Ash.—Western States. A middle-sized tree, of vigorous and rapid growth, and the wood has the same qualities as the preceding.

No. 208. *Fraxinus sambucifolia*, Lam.—Black Ash.—Northern and Western States. A large tree, usually growing in moist soil, and hence often called Swamp Ash. The wood is more elastic than that of any other species. It splits easily into thin, narrow strips, which are used for making baskets and hoops for barrels.

No. 209. *Fraxinus quadrangulata*, Michx.—Blue Ash.—Western States. This species is not found in the Atlantic States. It is found from Ohio to Wisconsin and southward to Kentucky and Tennessee. It is a large tree, growing from 60 to 70 feet high, with a diameter of 2 feet or more. The wood is quite as valuable as that of the White Ash, and is said to be much more durable when exposed to the weather; hence its value for fence-rails, posts, &c.

No. 210. *Fraxinus platycarpa*, Michx.—Carolina Water Ash.—Southern States. This species grows in swamps or marshy banks of rivers. It is usually 25 or 30 feet high, but sometimes becomes a large tree. The wood is remarkably light and soft, and probably has no economic value.

No. 211. *Fraxinus Curtissi*, n. sp.?—Southern States. Mr. Curtiss found at Eufaula, Ala., a large ash with remarkably small fruit. This species is provisionally called *F. Curtissi.* It requires further investigation.

No. 212. *Fraxinus Oregona*, Nutt.—Oregon Ash.—California and Oregon. The common ash of the Pacific coast. It grows 60 to 70 feet high. Is of equal value with the White Ash of the Eastern States.

No. 213. *Fraxinus dipetala*, H. and A.—California Flowering Ash.—California and Oregon.

No. 214. *Fraxinus pistaciæfolia*, Torr.—Texas and westward.

No. 215. *Fraxinus anomala*, Torr.—Single-leaf Ash.—Utah and Arizona. This ash is seldom more than a shrub 10 to 15 feet high, growing in ravines among the foot-hills of Southern Utah and Arizona. The leaves are simple, not pinnate, as in the other species.

No. 216. *Fraxinus coriacea*, Watson.—Thick-leaved Ash.—Utah and Arizona. A smallish tree, with thick, leathery leaves, growing in Southern Utah and Arizona.

No. 217. *Forestiera acuminata*, Poir.—Southwestern States.—A large shrub or small tree, of no economic value.

No. 218. *Forestiera ligustrina*, Poir.—Southern States.

NYCTAGENIACEÆ.

No. 219. *Poisonia obtusata*, Swartz.—South Florida. A small tree of Florida and the West Indies.

POLYGONACEÆ.

No. 220. *Coccoloba uvifera*, Jacq.—Sea-side Grape.—South Florida. This and the following species are low and spreading trees, along the coast in Florida and the West Indies. It is remarkable for the grape-like clusters of pear-shaped purple berries, which have an agreeable subacid taste, and which are much employed. The wood is heavy, hard, and valuable for cabinet-work.

No. 221. *Coccoloba Floridana*, Meisner.—Sea-side Grape.—South Florida.

LAURACEÆ.

No. 222. *Persea Carolinensis*, Nées.—Red Bay.—Southern States. This species occurs from Southern Virginia to Florida and the Gulf States.

It is found in the vicinity of swamps and swampy river-borders. In favorable situations, it grows to 50 or 60 feet high and 15 to 20 inches in diameter. The leaves are large, shining, and evergreen. The wood is of a beautiful rose-color, of a fine, compact grain, and finishes almost equal to mahogany.

No. 223. *Persea Catesbyana*, Chap.—Catesby's Bay.—South Florida.

No. 224. *Sassafras officinale*, Nées.—Sassafras.—Eastern United States. This tree is found over a large portion of the United States. It is usually a small tree, but sometimes attains a large size. The wood is not very strong, but is fine-grained and durable. It is valuable for cabinet-work. The bark of the root has a spicy, aromatic taste, and has some reputation as a medicine.

No. 225. *Oreodaphne Californica*.—California Myrtle.—California and Oregon. The California Laurel is a fine ornamental evergreen tree, growing in open places from 50 to 60 feet high. In thick woods, it has been found shooting up to 100 or 120 feet. The leaves have a very pungent odor, which produces headache in some persons. The wood is very beautiful, and is used for fine cabinet-work.

ELEAGNACEÆ.

No. 226. *Shepherdia argentea*.—Buffalo-berry.—Rocky Mountains. A large shrub or small tree, growing in thickets on the banks of streams in the Rocky Mountain valleys. The scarlet berries have an agreeable taste, and are employed as food by the natives.

EUPHORBIACEÆ.

No. 227. *Hippomane Mancinella*, L.—Manchineel.—South Florida.

No. 228. *Stillingia sebifera*, Michx.—Tallow-tree.—Naturalized in the Southern States. The Tallow-tree is a native of China, but has become extensively naturalized in the East and West Indies, and also in several of the Southern States along the sea-coast. In its native country, its seeds and pods are bruised and then boiled, which causes a kind of tallow to rise to the surface. This tallow is much employed in making candles.

No. 229. *Excœcaria lucida*, Swartz.—Poison-wood.—South Florida.

No. 230. *Drypetes crocea*, Poir.—A small tree of South Florida and the West Indies. The leaves are evergreen, and have much the flavor of tea.

No. 231. *Drypetes glauca*, Vahl.—South Florida.

URTICACEÆ.

No. 232. *Morus rubra*, L.—Red Mulberry.—Eastern United States. The Red Mulberry is found throughout the greater part of the United States east of the Mississippi, and also in some of the States west of that river.—(Bryant.) It is commonly a smallish tree, sometimes, however, attaining a large size. The berries are quite palatable, are eaten eagerly by birds, and also have a place in the markets as a second-rate fruit. The wood is strong, compact, and extremely durable.

No. 233. *Morus parvifolia*, Buck.—Small-leaved Mulberry.—Texas and westward.

No. 234. *Maclura aurantiaca*, Nutt.—Osage Orange.—Arkansas and Southwest. This tree, which is native in Arkansas and Texas, has been quite generally introduced over the country, chiefly from its extensive employment as a hedge-plant. The early French settlers called it *Bois d'arc*, or Bow-wood, from its use by the Indians for bows. The fruit is of the size and color of a large orange, but is not edible. The wood is very hard, elastic, fine-grained, and durable.

No. 235. *Ficus aurea*, Nutt.—Gum-tree; Wild Fig.—South Florida. There are many species of wild fig in the West Indies, but this species of South Florida has not been identified with any of them. It is a large tree, full of milky juice, which forms a kind of India rubber, whence it is also called Gum-tree. The fruit is very small and insignificant.

No. 236. *Ficus pedunculata*, Willd.—Wild Fig.—South Florida. This tree is also a native of the West Indies, and, like the Banyan of the West Indies, it sends downward aërial roots, which become fixed in the soil. The fruit is larger than the preceding, being the size of a large cherry.

No. 237. *Ficus brevifolia*, Nutt.—Wild Fig.—South Florida.

No. 238. *Ulmus Americana*, L.—White Elm.—Eastern United States. One of our most common and valuable trees, very popular as a shade-tree on account of its graceful form. It is one of the largest of the deciduous trees of the United States, attaining sometimes the height of 100 feet. The wood is employed for various purposes, but it is not considered durable when exposed to the weather.

No. 239. *Ulmus fulva*, Michx.—Slippery Elm.—Eastern United States. This is usually a smaller tree than the White Elm. It is not as much esteemed as an ornamental tree. The wood, however, is said to be of better quality and more durable. The inner bark is very mucilaginous, and is in extensive use for medical and surgical purposes.

No. 240. *Ulmus racemosa*, Thomas.—Corky White Elm.—Northern States. This tree is limited to the northern portions of the United States, being found sparingly in New England, New York, and westward to northern Illinois and Wisconsin. It closely resembles the White Elm, but may be distinguished by the corky wings of the smaller branches, which cause them to look grotesque and rough. Dr. S. H. Wright, of Penn Yan, N. Y., says it grows as rapidly as the White Elm, and he thinks will become as large. He has seen some young trees over two feet in diameter. The wood is tougher and finer grained than the White Elm.

No. 241. *Ulmus alata*, Michx.—Winged Elm.—Southern and Western States. This species does not grow in the Northern States except on the line of the Ohio River. It is a smallish tree, and has smaller leaves than the other kinds. The branches have a broad and thin corky wing on the opposite sides. The wood is finer-grained and more compact than the White Elm.

No. 242. *Ulmus Floridana*, Chap.—Florida Elm.—Florida.

No. 243. *Ulmus crassifolia*, Nutt.—Thick-leaved Elm.—Texas and Southwest.

No. 244. *Planera aquatica*, Gmel.—Planer tree.—Southern States. This tree is found in the Southern States and in Kentucky and Tennessee. It is a tree of medium size, with foliage somewhat like that of the European Elm. It is not a common tree, and the wood is not known to be applied to any useful purpose.

No. 245. *Celtis occidentalis*, L.—Sugar or Hackberry.—Eastern United States. This tree is rare in the New England States, but rather common in the Southern and Western ones. There are several varieties, one of which is usually a low and straggling bush. In the Western States, it often becomes a lofty tree. It somewhat resembles the elm in foliage and the ash in bark. It produces a dryish kind of berry about the size of a pea. The wood is white, but is not considered durable.

No. 246. *Celtis Mississippiensis*, Bosc.—Mississippi Hackberry.—Mississippi Valley.

No. 247. *Celtis reticulata*, Torr.—Net-leaved Hackberry.—Texas and Southwest. This is a western species, occurring in Texas and the Rocky Mountain region. It is a small tree, often a mere shrub.

No. 248. *Celtis pallida*, Torr.—Pale-leaved Hackberry.—Texas.

PLATANACEÆ.

No. 249. *Platanus occidentalis*, L.—Sycamore; Plane-tree.—Eastern United States. This is probably the largest deciduous tree in the United States. It occurs throughout the Eastern, Southern, and Western States, and extends beyond the Mississippi River. In the rich bottom-lands of the western rivers, it sometimes attains the enormous circumference of 40 to 45 feet. It much resembles the European Plane-tree, and is thought to possess a richer foliage, and to afford a deeper shade. As a timber-tree it is of little value, as the wood is liable to warp, and decays early.

No. 250. *Platanus racemosa*, Nutt.—California Sycamore.—California. This is the sycamore of the Pacific coast, extending from Central California to Mexico. Although a large tree, it does not attain the size of the eastern species. The wood is said to be more valuable, receiving a good polish and being more durable.

No. 251. *Platanus Wrightiana*, S. W.—Wright's Sycamore.—Arizona

JUGLANDACEÆ.

No. 252. *Juglans nigra*, L.—Black Walnut.—Eastern United States. This tree occurs in the Atlantic States, but attains its greatest perfect on and abundance in the valleys of the Ohio and Mississippi. It has been so much in request for the timber that it is much less common than formerly. The wood is used for the inside finish of houses, for cabinet-work, for gun-stocks, and many other purposes. It produces a nut much like the English walnut, but of stronger oily flavor. They are greatly relished by many persons.

No. 253. *Juglans cinerea*, L.—Butternut; White Walnut.—Eastern United States. This is more limited in range than the preceding. In Pennsylvania, New York, and New England, it probably attains its greatest perfection. It is a smaller tree than the Black Walnut. It is also found in the Western States. The wood is of a light-brown color, fine-grained, and easily worked. Although less valuable than the Black Walnut, the wood is well adapted to many uses. The nuts are not as highly esteemed as those of the Black Walnut.

No. 254. *Juglans Californica*, S. W.—California Walnut.—California. The California Walnut attains, in favorable situations, a height of 50 to 75 feet, and a diameter of 2 to 3 feet. It does not seem to be abundant, and we know nothing respecting the value of its wood. It has recently been distinguished as a different species from the walnut of Arizona and New Mexico.

No. 255. *Juglans rupestris*, Eng.—Small Black Walnut.—Texas and Arizona.

No. 256. *Carya olivæformis*, Nutt.—Pecan-nut.—Mississippi Valley. This tree grows in the valley of the Mississippi and its tributaries, on the Arkansas, the Missouri, the Illinois, the Wabash, and the Ohio, for some two hundred miles above its mouth. The wood is coarse-grained, heavy, and compact. It is a beautiful tree, with a straight and well-shaped trunk. The nut is well known in the markets, and is thought by some to be superior in flavor to any other nut known.

No. 257. *Carya alba*, Nutt.—Shell-bark Hickory.—Eastern United States. This species becomes a lofty tree, 80 feet high, with a diameter sometimes of 2 feet. It is one of the most valuable of the hickories for timber and for fuel. It furnishes most of the hickory-nuts of commerce. They are pleasant-flavored and hightly esteemed. On large trees, the bark shells off in long narrow plates, whence the common name of the tree. The wood is heavy, elastic, and strong, and for handles of axes and agricultural implements, and many other uses, it is unequaled. There is little difference in the quality and value of many of the different species of hickory.

No. 258. *Carya sulcata*, Nutt.—Western Shell-bark.—Western States.

No. 259. *Carya tomentosa*, Nutt.—Mocker-Nut.—Eastern United States.

No. 260. *Carya amara*, Nutt.—Bitter-nut.—Eastern United States. This is a large tree, growing from 60 to 70 feet high. The timber is said to be inferior to the preceding species, and the nuts are thin-shelled, bitter, and worthless.

No. 261. *Carya porcina*, Nutt.—Pig-nut Hickory.—Eastern United States. A large tree, with small pear-shaped fruit, the nuts bitterish and unpalatable. The wood is tough and valuable.

No. 262. *Carya microcarpa*, Nutt.—Small-fruited Hickory.—Eastern United States.

No. 263. *Carya myristicæformis*, Michx.—Nutmeg Hickory.—Southern States. This species grows in swamps in the Southern States. The fruit resembles a nutmeg, whence the name of Nutmeg Hickory. It is somewhat like that of the Bitter-nut tree, but much thicker.

No. 264. *Charya aquatica*, Nutt.—Swamp Hickory.—Southern States, A species growing in swamps in the Southern States, with astringent, bitter fruit, and brittle, worthless timber.

CUPULIFERÆ.

No. 265. *Quercus macrocarpa*, Michx.—Bur Oak; Overcup Oak.—Western States. This species is rare in the Eastern States, but common in Michigan, Illinois, Wisconsin, and Minnesota. It is a large tree, and when growing on low ground assumes a rounded and handsome form. It has very large acorns, which are usually deeply immersed in the cup; the border of the cup fringed with loose scales. The wood is open and brittle as it occurs in the prairie country, but valuable for fuel.

No. 266. *Quercus alba*, L.—White Oak.—Eastern United States. This is one of the noblest, largest, and most useful oaks of this country. The wood is strong, compact, and durable, and is only second to that of the Live Oak. It is extensively employed in ship-building, in manufacturing, and for many purposes.

No. 267. *Quercus lyrata*, Walt.—Southern Overcup Oak.—Southern States. This much resembles the Bur Oak, but is chiefly confined to the Southern States.

No. 268. *Quercus stellata*, Wang.—Post Oak.—Eastern United States. This species grows mostly upon poor clay lands. It is a middle-sized tree; the wood is yellowish, strong, fine-grained, and more durable than the White Oak.

No. 269. *Quercus bicolor*, Willd.—Swamp White Oak.—Eastern United States.

No. 270. *Quercus Michauxii*, Nutt.—Michaux's Oak.—Southeastern United States.

No. 271. *Quercus Prinus*, L.—Chestnut Oak.—Eastern United States. Of this species there are several varieties. It is usually a large and lofty tree. Its timber is inferior to that of the White Oak in strength, but is still very valuable for many uses.

No. 272. *Quercus Prinus*, L., var. *monticola*, Michx.—Rock Chestnut Oak.—New England and Middle States.

No. 273. *Quercus Prinus*, L., var. *acuminata*, Michx.—Yellow Chestnut Oak.—Northern and Western States.

No. 274. *Quercus Douglasii*, Hook. & Arn.—Douglas's Oak.—Rocky Mountains and California. This and the next two succeeding species are the California White Oaks, extending into Oregon and Columbia. They are probably of equal value with the eastern species.

No. 275. *Quercus Garryana*, Hook.—Garry's Oak.—California and Oregon.

No. 276. *Quercus lobata*, Nées.—California White Oak.—California.

No. 277. *Quercus undulata*, Torr.—Rocky Mountain Oak.—Rocky Mountains. This is the common oak of the Rocky Mountains, usually small and scrubby, but sometimes forming a moderate sized tree. It is very variable in the foliage.

No. 278. *Quercus densiflora*, Hook. & Arn.—California Tan-bark Oak—California. This is an anomalous species of California, between an oak and a chestnut. In open ground, it is a beautiful, spreading, pyramidal tree, with a trunk sometimes 5 to 6 feet in diameter. Among the forest-trees, it rises to 100 feet or more in height.

No. 279. *Quercus agrifolia*, Nées.—California Field Oak.—California. This is commonly known in California as Evergreen Oak. It grows usually in open grounds, with a wide, spreading, apple-tree-like top. It is usually a small tree, sometimes a mere shrub, and occasionally becoming 40 or 50 feet high.

No. 280. *Quercus chrysolepis*, Liebm.—Cañon Live Oak.—California. An evergreen oak, growing in rocky cañons and on mountain-sides. It is sometimes shrubby; sometimes like the last becoming 40 or 50 feet high. It furnishes the hardest oak-wood of the Pacific coast, and is used in making ox-bows, ax-handles, &c.

No. 281. *Quercus oblongifolia*, Torr.—Oblong-leaved Oak.—Arizona and California.

No. 282. *Quercus Emoryi*, Torr.—Emory's Oak.—Arizona.

No. 283. *Quercus hypoleuca*, Eng.—New Mexican Oak.—Arizona.

No. 284. *Quercus Durandii*, Buckley.—Durand's Oak.—Texas. This species approaches the Post Oak in general characters. The leaves are variable, being sometimes lobed and sometimes entire.

No. 285. *Quercus Phellos*, L.—Willow Oak.—Southern States. This species is confined to the States bordering the Atlantic and the Gulf; not, however, extending into the New England States. It is remarkable for its narrow, willow-shaped leaves. The wood is strong, but coarse-grained, and not durable.

No. 286. *Quercus virens*, Ait.—Live Oak.—Southern States. This is the famous Live Oak. It grows from Southern Virginia to Florida and westward in the vicinity of the sea-coast. The wood is more esteemed for ship-building than any other. It is evergreen, and is a large tree with spreading branches.

No. 287. *Quercus cinerea*, Michx.—Upland Willow Oak.—Southern States. A small tree, growing in sandy pine-barrens from North Carolina to Florida. It is evergreen, with leaves like the Willow Oak, but thicker, and downy on the under surface.

No. 288. *Quercus imbricaria*, Michx.—Shingle Oak.—Eastern United States. A middle-sized tree, reaching to 50 or 60 feet high, and with a diameter of 1½ to 2 feet. It grows principally, in open situations, from New Jersey to Illinois and southward. Its foliage is handsome, resembling that of the Laurel. The wood is coarse-grained, and not durable.

No. 289. *Quercus aquatica*, Catesb.—Water Oak.—Southern States. A middle sized tree, of the Southern States, growing on the borders of swamps. The leaves are perennial, of variable form, but always broadest at the upper portion and tapering to a point at the base.

No. 290. *Quercus laurifolia*, Michx.—Water Oak.—Southern States.

No. 291. *Quercus nigra*, L.—Black Jack.—Eastern United States. A small, scrubby tree, growing usually in poor clay soil. It is found in New Jersey, Maryland, and southward, as also in some of the Western States. The wood furnishes a good fuel, but is too coarse-grained and perishable for any use in the arts.

No. 292. *Quercus falcata*, Michx.—Spanish Oak.—Eastern United States. A large tree, attaining 80 feet or more in height, and sometimes 4 feet in diameter. It has about the same range as the Black Jack, not being found in New England nor in the northern part of the Western States. The wood is not valuable except for fuel.

No. 293. *Quercus Catesbaei*, Michx.—Turkey Oak.—Southern States. A small tree, with foliage much like the preceding. It is found in Florida, Georgia, and North and South Carolina. The wood is good fuel, but of no value as timber.

No. 294. *Quercus rubra*, L.—Red Oak.—Eastern United States. This is one of the largest oaks of our country, and is diffused over all the eastern portion of the United States, but more especially to the northward. It is a beautiful tree, with reddish, coarse-grained wood, which is little used in the arts except for barrel-staves.

No. 295. *Quercus coccinea*, Wang.—Scarlet Oak.—Eastern United States. The Scarlet and Quercitron Oaks do not differ much in their characters, and, indeed, are considered but as varieties of one species. They form large and handsome trees, and the bark furnishes a yellow dye which is used in the arts.

No. 296. *Quercus tinctoria*, Bart.—Quercitron Oak.—Eastern United States.

No. 297. *Quercus palustris*, Du Roi.—Pin Oak.—Eastern United States. A rather smaller tree than the preceding. The leaves are small, smooth, of a pleasant green color, very similar to those of the Scarlet Oak. The wood is stronger and more durable than that species. It is chiefly limited to the Northern States.

No. 298. *Quercus Sonomensis*, Benth.—California Oak.—California. This species of California is nearly related to the *Quercus rubra* of the

Eastern States. It grows in mountainous districts, and forms a pretty large tree.

No. 299. *Quercus Wislizenii*, DC.—**California Live Oak.—California. A smallish tree of California, with bright-green persistent leaves, sometimes called Live Oak.**

No. 300. *Quercus dumosa*, Nutt.—Dwarf Oak.—California. This is a common dwarf oak in Southern California.

No. 301. *Quercus reticulata*, H. B. K.—Dwarf Oak.—Southern Arizona.

No. 302. *Castanea vesca*, L., var. *Americana*, Gr.—American Chestnut.—Eastern United States. One of the noblest trees of American forests. It occurs from Massachusetts to Michigan, and in the mountainous districts of Pennsylvania, Virginia, and Tennessee, but not on the prairie regions of the Western States. The wood is strong, elastic, and durable, and is largely employed in the manufacture of furniture and for the inside finish of railroad-cars and steamboats. The nuts are very sweet and palatable, and always command a good price in the markets.

No. 303. *Castanea pumila*, Michx.—Chineapin.—Southern States. This may be called a dwarf chestnut, growing from New Jersey and Pennsylvania to Florida. Northward it is only a large shrub, but in South Carolina and Florida it becomes a tree of 30 to 40 feet high and 12 to 15 inches diameter. The wood equals that of the chestnut, but the nuts, although generally eaten by children, are not comparable to those of the former.

No. 304. *Castanopsis chrysophylla*.—California Chestnut.—California. A tree of Oregon and California, becoming 60 to 100 feet high and 2 to 3 feet diameter. The bur is scarcely one-third as large as in the common chestnut, with shorter prickles. The shell of the nut is almost as large as the filbert.

No. 305. *Castanopsis chrysophylla*, var. *pumila*.—California Chineapin.—California. This is mostly a shrub growing on open mountain-sides, and is sometimes called California Chineapin.

No. 306. *Fagus ferruginea*, Ait.—Beech.—Eastern United States. The Beech is one of our loftiest trees, sometimes reaching the height of 100 feet. It grows from Canada to the Gulf of Mexico. It is wanting in the prairie districts of the West. The wood is hard, fine-grained, and compact. It is largely used for shoe-lasts and handles of tools. It is also employed in the frame-work of buildings. The wood is in great repute as fuel. The nuts have a delicious flavor, but are too small to make them of much economic importance.

No. 307. *Carpinus Americana*, Michx.—Blue Beech.—Eastern United States. A small tree 15 to 20 feet high. The wood is white, compact, and fine-grained.

No. 308. *Ostrya Virginica*, Willd.—Hop Hornbeam; Ironwood.—Eastern United States. The Ironwood is a small tree, but sometimes grows to a height of 40 feet. The wood is heavy and fine-grained, and is used for mallets, wedges, levers, &c. Its growth is very slow.

No. 309. *Corylus rostrata*, var. *Californica*.—California.

MYRICACEÆ.

No. 310. *Myrica cerifera*, L.—Bayberry; Wax Myrtle.—Eastern United States. A shrub or small tree growing near the sea-coast. The berries are coated with a waxy secretion, which is sometimes utilized in the domestic manufacture of candles and also in medicinal unguents.

No. 311. *Myrica inodora*, Bart.—Florida Bayberry.—Florida.

No. 312. *Myrica Californica*, Cham.—California Bayberry or Myrtle.—California. This species sometimes attains a height of 40 feet, with a trunk 2 feet in diameter. It grows on the Pacific coast, from Puget Sound to Mexico.

BETULACEÆ.

No. 313. *Betula alba*, var. *populifolia*, Spach.—American White Birch.—Northern and Northeastern United States. A small and slender graceful tree, 15 to 25 feet high, growing from Maine to Pennsylvania, and sparsely on the great lakes.

No. 314. *Betula papyracea*, Ait.—Canoe Birch; Paper Birch.—Northern and Northeastern United States. A large and handsome tree, growing to the height of 70 feet, and with a diameter of 3 feet. It is limited to the northern portions of the country, ranging from Maine to Wisconsin on the northern border, and extending far northward into Canada. It has a brilliant white bark, from which Indians and traders construct canoes. The thin, external sheet of the bark forms the basis of a great variety of Indian fancy-work.

No. 315. *Betula lutea*, Michx.—Yellow Birch.—Northern and Northeastern United States. This is a beautiful large tree, growing in moist woods on our northern border. The wood is strong, fine-grained, and makes handsome furniture.

No. 316. *Betula lenta*, L.—Cherry Birch; Black Birch.—Northern and Northeastern United States. This, like the preceding, is a large tree, chiefly of our northern borders, but extending also along the Alleghany region southward. The bark and twigs are highly aromatic. The wood is of a rosy hue, fine-grained, and valuable for cabinet-work and for timber.

No. 317. *Betula nigra*, L.—River Birch; Red Birch.—Eastern United States. This becomes a large tree in favorable situations. It is found along the banks of rivers from Eastern Massachusetts southward to Florida, and westward to Kentucky, Illinois, and Iowa. The wood is similar to that of the preceding.

No. 318. *Betula occidentalis*, Hook.—Western Birch.—Rocky Mountains. This species is a small tree, rarely over 25 feet high and 6 inches in diameter. It is found in the Rocky Mountains, along streams; in Colorado, Utah, &c.

No. 319. *Alnus incana*, Willd.—Speckled Alder.—Northeastern United States. A shrub, or small tree, growing along streams in New England, New York, and northward. Of no particular value.

No. 320. *Alnus rhombifolia*, Nutt.—California Alder.—California.

No. 321. *Alnus Oregona*, Nutt.—Oregon Alder.—California and Oregon. On the Pacific coast, in California and Oregon. Often becoming a large tree, 60 to 80 feet high, with a trunk 2 feet in diameter.

SALICACEÆ.

No. 322. *Salix nigra*, Marshall.—Black Willow.—Eastern United States. This is almost the only willow of the eastern portion of the continent which attains a tree size. It grows from 20 to 30 feet high, with a thick black bark. On the Pacific coast are several species which become tree willows.

No. 323. *Salix nigra*, var. *Purshiana*.—Willow.—Texas.

No. 324. *Salix longifolia*, Muhl., var.—California Long-leaved Willow.—California.

No. 325. *Salix Wrightiana*, And.—Wright's Willow.—Texas.

No. 326. *Salix lasiolepis*, Benth.—Willow.—California.

No. 327. *Salix lucida*, Hook., var.—California Shining Willow.—California.

No. 328. *Populus tremuloides*, Michx.—American Aspen.—Eastern United States and Rocky Mountains. A small tree of the northern border and Canada, also found on mountain-sides through the Rocky Mountains.

No. 329. *Populus grandidentata*, Michx.—Great-toothed Aspen.—Eastern United States. This is a larger tree than the preceding, common in the Northern States, and extending southward along the Alleghany Mountains. It much resembles the European Silver Poplar.

No. 330. *Populus monilifera*, Ait.—Cottonwood.—Eastern United States and Rocky Mountains. This and the next species of cottonwoods have a wide range throughout most parts of the United States. Some botanists consider them to be but forms of one species. They are large, rapidly-growing trees, particularly abundant in the prairie regions and western river banks, extending even to the Pacific Ocean. The wood is light and soft, much employed in some of the Western States for building purposes, and for inside work of houses, under the name of White-wood and Cottonwood.

No. 331. *Populus angulata*, Ait.—Cottonwood.—Southern States.

No. 332. *Populus heterophylla*, L.—Swamp Cottonwood.—Eastern United States. This species prevails in the Southern States, but extends northward as far as Delaware and Southern Illinois. It is a large tree, growing chiefly in swampy woods, and little valued.

No. 333. *Populus balsamifera*, L.—Balsam Poplar.—Northern and Western United States. This species grows mostly in northern latitudes, being found in New England and Northern New York, also in the Rocky Mountains. It is a large tree; a variety of it is in cultivation.

No. 334. *Populus angustifolia*, James.—Willow-leaved Cottonwood.—Rocky Mountains. This is now considered to be a variety of the preceding. It is found principally along streams in the Rocky Mountains, where it is called Cottonwood, sometimes Willow-leaved Cottonwood.

No. 335. *Populus trichocarpa*, Torr.—Cottonwood.—California.

CONIFERÆ.

No. 336. *Pinus Banksiana*, Lamb.—Banks's Pine; Scrub Pine.—Wisconsin to New England. This species is found from the northern parts of the United States nearly to the Arctic Ocean, and from Labrador to the Saskatchawan. In Wisconsin it becomes a middle-sized tree, and is used for timber when the trees are found of sufficient size.

No. 337. *Pinus contorta*, Dougl.—Twisted pine.—Rocky Mountains. This tree is found in the Rocky Mountains from Colorado to Oregon. It differs widely in regard to size in different localities. Near the Pacific coast it is often low and scrubby, bearing cones at 5 feet high. In Colorado it is found at an altitude of 7,000 feet, and attains a height of 50 feet.

No. 338. *Pinus contorta*, Doug., var. *Bolanderi*.—Bolander's Pine.—California. This variety in the Sierra Nevada Mountains at an altitude of 5,000 to 9,000 feet attains a height of 150 to 200 feet. It is variously called Tamarack, Twisted Pine, or Black Pine.

No. 339. *Pinis inops*, Ait.—Jersey Pine; Scrub Pine.—Eastern United States. A straggling tree 15 to 40 feet high, with spreading or drooping branches. It abounds in New Jersey, Maryland, and Virginia, also on the rocky hills bordering the Ohio in Kentucky, Southern Illinois, and Indiana. The wood is of little value.

No. 340. *Pinus mitis*, Michx.—Yellow Pine.—Eastern United States, chiefly south. This is a handsome tree, growing from New England to Wisconsin, and sparingly in Missouri, Kentucky, Tennessee, and southward to Florida. The timber is very valuable, commanding a higher price even than the white pine.

No. 341. *Pinus clausa*, Chap.—Florida. A small tree found by Dr. Chapman at Apalachicola, related to *Pinus inops*.

No. 342. *Pinus glabra*, Walt.—Spruce Pine.—South Carolina and southward. A tree 40 to 60 feet high, with smoothish bark and soft white wood, branching from near the ground. Resembles *P. mitis;* grows from South Carolina to Florida.

No. 343. *Pinus resinosa*, Ait.—Red Pine.—Massachusetts to Wisconsin. A tree 50 to 80 feet high, with reddish bark, growing from Pennsylvania northward through Canada and Nova Scotia, also in Wisconsin and Michigan. The wood is compact, strong, and durable, and for some uses is preferable to the white pine. It is also an excellent ornamental tree.

No. 344. *Pinus Elliottii*, Eng.—Elliott's Pine.—South Carolina and southward.

No. 345. *Pinus pungens*, Michx.—Table Mountain Pine.—This species grows on the Alleghany Mountains from Pennsylvania southward; abundant in some parts of Virginia and North Carolina. A tree of 40 or 50 feet height, and of very vigorous and rapid growth.

No. 346. *Pinus muricata*, Don.—Bishop's Pine.—California. A small tree 30 to 40 feet high; grows near the coast north and south of San Francisco, and in other localities in that State.

No. 347. *Pinus edulis*, Eng.—Piñon Nut Pine.—Rocky Mountains. A low tree with a spreading habit, growing in Colorado and Utah, and in New Mexico, Arizona, and Southern California. It is universally known by the Mexican name of Piñon. It has an edible nut, which is much used as food by the Indians, and the wood is rich in resin, making it excellent fuel.

No. 348. *Pinus monophylla*, Torr.—Nut Pine.—Sierra Nevada Mountains. This species is almost limited to the eastern slope of the Sierra Nevada Mountains, at altitudes of 2,000 to 6,000 feet. It is a small tree of 20 to 40 feet height. The seeds are eagerly collected for food by the Washoe and other Indians. The wood is excellent fuel.

No. 349. *Pinus Parryana*, Eng.—Nut Pine.—Near the Mexican border southwest.

No. 350. *Pinus ponderosa*, Dougl.—Yellow Pine.—Rocky Mountains. A very variable pine; several of its extreme forms have been considered different species. It occurs in Colorado, Utah, and the Black Hills of Wyoming. It is remarkable for its heavy wood, which makes excellent lumber. It is generally called Yellow Pine.

No. 351. *Pinus ponderosa*, Doug., var. *Benthamiana*, Hart.—Sappy Pine.—California. This variety grows in the Sierra Nevada Mountains, in damp valleys, and near streams. It is generally slender and tall, with low limbs, black bark, and sappy, tough wood. Used for building timber, flooring, &c. It has several names, as Swamp Pine, Sappy Pine, Black Pine, and Bull Pine.

No. 352. *Pinus ponderosa*, Doug., var. *Jeffreyi*, Balf.—Jeffrey's Pine.—California. This variety also grows on the Sierra Nevada Mountains, and on the Coast Range of California. It often attains a height of 170 to 250 feet and a diameter of 6 to 10 feet. It differs much in the quality of the wood, but is used for all the purposes of other kinds. It is remarkable for the comparatively large size of its cones. It is called Yellow Pine, Pitch Pine, and Truckee Pine.

No. 353. *Pinus australis*, Michx.—Long-leaved Pine.—South Carolina and southward. A lofty tree, growing in the pine-barrens of the Southern States, attaining a height of 75 to 100 feet. Next to the White Pine, this is perhaps the most valuable of the genus. The timber plays an important part in ship-building, is extensively used as a flooring, and in house-building. The chief value of this species is for the turpentine, tar, pitch, and rosin which it supplies, and of which immense quantities are exported in addition to the home supply.

No. 354. *Pinus Coulteri*, Doug.—Coulter's Pine.—California. A large tree of California, from 80 to 100 feet in height, with large, spreading branches, and a trunk 3 or 4 feet in diameter. The cones are heavier than those of any other of the family, being frequently 1 foot long and 6 inches diameter, and weighing from 4 to 6 pounds. The large, nut-like seeds contained in the cones are nutritious, and used as an article of food by the Indians.

No. 355. *Pinus Sabiniana*, Doug.—Hard-nut Pine; Sabine's Pine.—California. Grows on the foot-hills of the Coast Range and on the western foot-hills of the Sierra Nevada Mountains of California. It is not very abundant, and is limited by the altitude of 4,000 feet. It grows from 40 to 100 feet high. The cones are large and heavy, and full of oily, nutritious nuts, which are used by the Indians. The timber is fit only for fuel. It is called Digger Pine, Foothill Pine, Gray-leaved Pine, &c.

No. 356. *Pinus Torreyana*, Parry.—Torrey's Pine.—California. A species of Southern California, resembling the preceding, but smaller. The nuts are thick-shelled, but nutritious, and used as food by the Indians.

No. 357. *Pinus insignis*, Dougl.—Monterey Pine.—California. Grows along the coast south of San Francisco. Some old trees near Monterey are 70 or 80 feet high. It is quite an ornamental species, and is in frequent cultivation in California.

No. 358. *Pinus radiata*, Don.—California.

No. 359. *Pinus tuberculata*, Don.—Prickly-coned Pine.—California. A small tree seldom attaining a greater height than 30 to 40 feet, with a trunk of 8 or 10 inches diameter. It grows on the Coast Hills south of San Francisco, and in other places in the State.

No. 360. *Pinus rigida*, Miller.—Pitch Pine.—Eastern United States. A medium-sized tree from 30 to 70 feet high, with dark, rugged-looking bark, and hard, resinous wood. The wood is knotty, and of little value for lumber, but gives an intense heat in burning on account of the quantity of resin which it contains.

No. 361. *Pinus serotina*, Michx.—Pond Pine.—Southern States. This is closely related to the preceding, and is by some considered only a variety of it. It grows on the borders of ponds and swamps from Florida to North Carolina.

No. 362. *Pinus tæda*, L—Loblolly; Old-field Pine.—Southern States. A species confined to the Atlantic States, growing mostly in damp or in light, barren soil, frequently taking possession of old and neglected fields. It is variable in height, sometimes rising to 70 or 100 feet high. The timber is said to be valuable, though less so than that of *P. australis*.

No. 363. *Pinus aristata*, Eng.—Prickly-coned Pine.—Rocky Mountains. This species was first found in Colorado near Pike's Peak, but it is now considered to be synonymous with the next.

No. 364. *Pinus Balfouriana*, Jeffrey.—Balfour's Pine.—Rocky Mountains. The specimen is from Southern Utah, and grows on high, barren, sandstone mountains; it grows about 50 to 60 feet high. The tree is distinguished by its long branches, which are heavy, causing the ends to hang down. The tree is compact in appearance and of very dark-green color. It is thought by some that the tree of Oregon, which has been described under this name, is a different species.

No. 365. *Pinus flexilis*, James.—Bull Pine.—Rocky Mountains. This is the prevailing pine of the East Humboldt Mountains, Nevada, and frequent in the Wasatch. It also grows in Colorado and on the San Francisco Mountains of Arizona. In the Wasatch Mountains it is found at high altitudes on limestone ledges, and has a branched and knotty habit, rendering it unfit for lumber. It is called by the inhabitants Bull Pine. It is a middle-sized tree, usually 30 to 50 feet high, but recorded by Fendler as 60 to 80 feet high near Santa Fé.

No. 366. *Pinus albicaulis*, Eng.—White-barked Pine.—Rocky Mountains. This species, although closely related to the preceding, is believed to be different. It grows only at extreme altitudes. It grows on the Cascade Mountains of Oregon, on alpine peaks in the Sierra Nevada Mountains, and on high mountains in Idaho and Montana. The name is suggested by the color of the bark of the tree, which Dr. Engelmann says is as white as milk.

No. 367. *Pinus Lambertiana*, Doug.—Sugar Pine.—Sierra Nevada Mountains. Found sparsely growing on the Sierras of California, through their extent, at altitudes of from 4,000 to 10,000 feet. It is often 150 to 220 feet high, with a diameter of 8 to 14 feet. It is highly prized and eagerly sought by lumbermen for all articles of building-lumber, and is fast being exhausted. It is called Sugar Pine from the sweet resin which exudes from partially-burned trees. It is also called Mammoth Pine and Shake Pine. It has enormous cones.

No. 368. *Pinus monticola*, Dougl. Soft Pine; Little Sugar Pine.—California. Grows sparsely on the high Sierras, at altitudes of 7,000 to 11,000 feet. It sometimes attains a height of 150 to 200 feet, with a diameter of 5 to 7 feet. It resembles the Sugar Pine, but with whitish, much furrowed, bark and smaller cones. The timber is similar to that of White Pine, but is seldom used, because the trees are so inaccessible.

No. 369. *Pinus strobus*, L.—White Pine; Weymouth Pine.—Eastern United States. An old, well-known, and useful tree, extending from Canada to Virginia, but plentiful in New England, New York, and Pennsylvania. It is a large tree, becoming 100 to 150 feet high. It is the source of much of the lumber brought from the Northern States. It is not only very valuable on account of its wood, but is one of the finest ornamental conifers.

No. 370. *Pinus Chihuahua*, Eng.—Southern Arizona and Northern Mexico.

No. 371. *Abies alba*, Michx.—White Spruce.—New England and Alleghany Mountains. A small tree, native of the northern portion of the United States and Canada, extending northward to the extreme confines of vegetation. It grows from 20 to 30 feet high, according to soil and latitude. It is frequent in cultivation, and is considered a handsome tree.

No. 372. *Abies nigra*, Poir.—Black Spruce.—New England and Allegheny Mountains. This tree has much the same range as the preceding, occasionally being found farther south on the Alleghanies. In favorable situations, it forms quite a large tree, about 75 feet high, tall and straight. The wood is light, elastic, and strong, and valuable for many purposes.

No. 373. *Abies Canadensis*, Michx.—Hemlock.—New England to Wisconsin. A well-known tree of the Northern States, extending northward to Hudson's Bay, and southward along the mountains to North Carolina. It is one of the most graceful of spruces, with a light and spreading spray, frequently branching almost to the ground. The wood is oarse-grained, but is used in great quantities for rough work. The bark is very extensively employed in tanning.

No. 374. *Abies Mertensiana*, Lind.—Western Hemlock.—California and Oregon. This tree closely resembles the *A. Canadensis*. It grows from 100 to 150 feet high, and forms a roundish, conical head. The timber is said to be soft and white, and difficult to split.

No. 375. *Abies Williamsoni*, New.—Williamson's Spruce.—California and Oregon. Grows on the Sierras of California and on the Cascade Mountains of Oregon, on high peaks of 8,000 to 12,000 feet altitude. A very graceful tree, attaining a height of 150 feet. The wood is of excellent quality, but is too rare and inaccessible to be much known.

No. 376. *Abies Douglasii*, Lind.—Douglas's Spruce.—Rocky Mountains. This species grows through the Rocky Mountain region from Colorado to Nootka Sound. On the Pacific coast it sometimes attains the immense size of 200 to 300 feet in height, and a diameter of trunk of 8 to 15 feet. Its timber composes the great lumber wealth of Oregon and Washington Territory. The wood is soft and easily worked, much prized for masts, spars, and plank for ship-building, and is equally valuable for other building purposes. A tree cut by Mr. A. J. Dufur was 6 feet 4 inches in diameter 30 feet from the base, and 321 feet long.

No. 377. *Abies Douglasii*, var. *macrocarpa*, Torr.—Large-coned Spruce.—Southern California. This was collected many years ago on the mountains east of San Diego, Cal.; in 1874 sent to the Department of Agriculture by Mr. F. M. Ring, of San Bernardino, Cal.; and collected last summer by Dr. Palmer at San Felipe Cañon, east of San Diego. It has cones four or five times the size of *Douglasii*, and will probably be confirmed as a new species.

No. 378. *Abies Menziesii*, Dougl.—Menzies's Spruce.—Rocky Mountains. This species has a wide range in the Rocky Mountains from Colorado and Utah to Oregon and Sitka. It grows mostly at high altitudes, 7,000 to 9,000 feet.* "In Utah," Mr. Ward says, "it is easily distinguished from the other firs by the dense masses of its long, pendant, dark-brown cones at the top of the tree, which frequently obscure the foliage. The wood is fine-grained and white, and would be valuable for timber but for the numerous slight curves in the trunk, which render it impossible to obtain saw-logs of any great length. In some places it is incorrectly called balsam, in others it is distinguished as spruce." Mr. Dufur, of Oregon, gives a somewhat different account of the tree as growing there. He says: "It grows along the tide-lands and about the mouth of the Columbia River, and is seldom found at an elevation of more than 500 feet. The young trees make a beautiful evergreen of pyramidal form. The large trees grow from 150 to 200 feet high, and from 2 to 6 feet in diameter. The wood is soft, white, and free, much prized for lumber."

No. 379. *Abies Engelmanni*, Parry.—Engelmann's Spruce.—Rocky Mountains. This species is found on the higher parts of the Rocky Mountains, from New Mexico to the headwaters of the Columbia and Missouri Rivers. In Colorado, it occupies a belt between 8,000 and 12,000 feet, reaching its fullest development between 9,000 and 10,000 feet. On the highest summits, it becomes a prostrate shrub. Mr. Ward, writing of the tree in Utah, says: "Between 9,000 and 10,000 feet altitude, it becomes a large and noble tree, and is of greatest value for lumber, taking the place in that region of the White Pine of the Eastern States and is alone known by that name among lumbermen. The wood is white, very light, and easily worked, and at the same time durable." Botanically, it is difficult to distinguish it from some forms of *A. Menziesii*.

No. 380. *Abies balsamea*, Marshall.—Balsam.—New England to Wisconsin. This species grows in cold, damp woods and swamps, from New England to Pennsylvania, Wisconsin, and northward. It is also a native of Canada and Nova Scotia. It generally grows about 20 to 40 feet high. It is a very popular ornamental tree. "A very aromatic liquid resin is obtained from this tree by incisions made in the bark, and is called Canada Balsam."

No. 381. *Abies sub-alpina*, Eng.—Sub-alpine Balsam.—Rocky Mountains. This is one of the tallest and handsomest firs of the Rocky Mountains, often attaining a height of 80 or 90 feet; perfectly straight, and without limbs for a great distance. The wood is white, soft, and of little value for lumber. It is known among the lumbermen of the Wasatch Mountains as White Balsam, or Pumpkin-tree. Its nearest affinity is to *A. balsamea* of the Eastern States. It reaches to great altitudes, being sometimes found near the timber-line. It has often been collected, and generally referred to *A. grandis*, the incorrectness of which has been but lately pointed out by Dr. Engelmann, who has proposed for it the name given above.—(Ward.)

No. 382. *Abies grandis*, Lind.—White Silver Fir.—California and Oregon. This name is here applied to the tree of the Pacific coast. "In Oregon," Mr. Dufur says "it grows on the low, moist land, along the small streams emptying into the Columbia River. Is seldom found at an elevation of more than 500 feet, and never on sandy or gravelly ridges. It attains a size of from 2 to 4 feet in diameter, and 200 feet in height. It has a light-colored, thin, smooth bark. It is a rapid grower, and the timber decays correspondingly fast when exposed to the wet. The wood is white, free, and soft, but too light and brittle for general building purposes. It is used extensively by the settlers for clapboards, boxes, and cooperage."

No. 383. *Abies concolor*, Eng.—White Silver Fir.—Rocky Mountains. In the Wasatch Mountains in Utah this tree is very valuable for lumber, and is called Black Balsam. It is there a large tree, sometimes 3 or 4 feet in diameter and 40 to 50 feet high. The wood is tough and coarse-grained, adapting it for building purposes and all substantial uses. It ranges from 8,000 to 9,000 feet in altitude.—(Ward.) In Southern Utah, it is sometimes called Black Gum.

No. 384. *Abies amabilis*, Dougl.—Red Silver Fir.—California and Oregon. Mr. Lemmon states, "On the Sierra Nevada Mountains, it forms dense, scattered groves, at altitudes of 7,000 to 10,000 feet. The largest trees are 250 feet high and 6 to 10 feet in diameter. A truly, beautiful and magnificent tree, sometimes called the Queen of the Forest." Mr. Dufur says it is found extensively along the western slope of the Cascade Mountains, on sandy, gravelly, rocky, and dry elevations. Its usual size is from 150 to 200 feet in height, and from 1 to 4 feet in diameter. The wood is rather coarse, but elastic, strong, and hard. It is used extensively for coarse building purposes, and also for masts and spars for ship-building. The wood has a peculiar red color, and spikes, nails, and bolts hold firm, and never corrode in the timber.

No. 385. *Abies Fraseri*, Pursh.—Fraser's Balsam.—Alleghany Mountains. This species inhabits the highest parts of the Alleghanies, in North Carolina. It is said to be a small tree, ranging from 20 to 50 feet in height. The cones resemble those of *A. nobilis* in miniature.

No. 386. *Abies nobilis*, Lind.—The Noble Fir—Oregon. This is one of the magnificent conifers of our country. It is a majestic tree, forming vast forests on the mountains of Northern California and Oregon. The Indians give it the name of Big Tree. The timber is said to be of excellent quality. It is nearly related to *A. Fraseri*, but has cones five times as large.

No. 387. *Abies bracteata*, Hook.—Bracted-coned Spruce.—California. This species grows on the Santa Lucia Mountains, California. It is little known. The cones are very curious and remarkable, being handsomely fringed by long leaf-like bracts, entirely different from those of any other species.

No. 388. *Larix Americana*, Michx.—American Larch.—New England to Wisconsin. This species is seldom found so far south as Virginia; its favorite localities being the New England States, Northern New York, westward to Wisconsin, and northward to Canada. In Canada, it is called Hackmatack; in some portions of New England and New Jersey, Tamarack. The quality of the wood is represented as being superior to any kind of pine or spruce.

No. 389. *Larix Lyallii*, Parl.—Lyall's Larch.—Oregon.

No. 390. *Larix occidentalis*, Nutt.—Western Larch—Oregon. Mr. Dufur says this species is found abundantly in the Blue Mountains in Eastern Oregon, also well up in the Cascade and Coast Ranges, but seldom at an elevation of less than 3,000 feet. It is often found 250 feet high, and attains a diameter of 5 feet, frequently being found 200 feet to the first limb. The timber is very strong and durable, free to split, and used for all kinds of fencing and coarse building.

No. 391. *Torreya taxifolia*, Arn.—Yew-leaved Torreya.—Florida. A small tree from 20 to 40 feet high, found on the east bank of the Apalachicola River in Florida. It is called by the inhabitants Stinking Yew, from the unpleasant odor of the bruised leaves. The genus was named in honor of Dr. John Torrey, the late eminent botanist of New York. It is considered to be a very ornamental evergreen in cultivation.

No. 392. *Torreya Californica*, Torr.—California Nutmeg-tree.—California. This species grows near the coast in California. It sometimes attains the height of 60 feet, with a trunk 4 feet in diameter, but is usually a round-headed, small, compact tree, 20 to 40 feet high. The timber is said to be heavy and fine-grained. It is, like the preceding, called the Stinking Yew, from the unpleasant odor of the bruised leaves. The seeds have a rugose and mottled appearance, resembling a nutmeg, whence the name.

No. 393. *Taxus brevifolia*, Nutt.—Short-leaved Yew.—California and Oregon. A tree of California and Oregon, varying much in height in different localities. Dr. Newberry saw it forming an upright tree 50 to 75 feet in height and 2 to 3 feet in diameter. Mr. Dufur says it is found on the lowlands of Willamette Valley, is of slow growth, and seldom attains a height of 12 to 20 feet and a diameter of a foot. It is very scarce in all parts of Oregon. The small, red berries remain on the tree till late in the fall, and are used for food by the Indians. The wood is very hard and durable, is capable of receiving a fine polish, and is much prized for its fine grain, durability, and beauty.

No. 394. *Taxus Floridana*, Nutt.—Florida Yew.—Florida. This species, so far as is known, is confined to very limited field on the Apalachicola River in Florida. It is a small tree, from 10 to 20 feet high.

No. 395. *Thuja occidentalis*, L.—American Arbor Vitæ.—New England to Wisconsin. This tree is well known in cultivation, but in a native state is rarely found south of New York. In Canada and along the lakes it is known as the White Cedar, which is the name given in New Jersey to the *Cupressus thyoides*. The Arbor Vitæ grows 25 to 50 feet high, forming a handsome, conical tree. The wood is light and soft, but durable, and is considerably used for building purposes. It is frequently employed as a hedge plant and as an ornamental tree.

No. 396. *Thuja gigantea*, Nutt.—Giant Arbor Vitæ.—Oregon and Northwest coast. This tree is found in the greatest perfection on the western slope of the Cascade and Coast Ranges in Oregon and Washington Territory, at an altitude of from 500 to 1,000 feet. It attains not unfrequently the enormous size of from 10 to 15 feet diameter and 200 feet in height. The timber is very soft, smooth, and durable. It makes the finest sash, doors, moldings, &c., and all kinds of building-lumber The young trees are beautiful ornamental evergreens, and make a handsome hedge.

No. 397. *Thuja plicata*, Don.—Nee's Arbor Vitæ.—Pacific coast.

No. 398. *Cupressus thyoides*, L.—White Cedar.—Middle and Southern States. This tree is found in swamps chiefly in the Atlantic States from Massachusetts to Florida. It has also been found near the Great Lakes. The tree rarely exceeds 70 or 80 feet in height, with a straight, tapering trunk. The wood is light, fine-grained, exceedingly durable, and easily worked. In New Jersey it is largely made into shingles.

No. 399. *Cupressus macrocarpa*, Hart.—Monterey Cypress.—California. This is found in the vicinity of Monterey, Cal., where it grows 50 to 60 feet high, with a diameter sometimes of 3 to 4 feet. It is one of the finest cypresses known.

No. 400. *Cupressus Nutkanus*, Hook.—Nootka Cypress.—Oregon and the Northwest coast. This grows at Vancouver's Island and near Nootka Sound. It is a tall tree of 80 to 100 feet high. The timber is white, soft, and valuable.

No. 401. *Cupressus Lawsoniana*, Murray.—Lawson's Cypress.—Mountains of Northern California.

No. 402. *Cupressus MacNabiana*, Murray.—McNab's Cypress.—Mountains of California and Oregon.

No. 403. *Taxodium distichum*, Rich.—Bald Cypress.—Southern States. This tree is found in all the Southern States, extending into Delaware and into Southern Illinois. In rich, alluvial bottoms, it frequently grows to the height of 120 feet. The roots often form large conical excrescences, called "cypress knees," which rise above the surface of the soil to the height of 2 to 4 feet. The wood is fine-grained, soft, elastic, strong, and exceedingly durable. Large quantities are made into shingles, and marketed at the North. Its foliage is delicate and beautiful, but is dropped during the winter.

No. 404. *Sequoia sempervirens*, End.—Redwood.—California. This is the mammoth tree of the coast of California, second only to the next species. It rises to the height of 200 to 300 feet, and sometimes with a circumference of 60 feet. The wood is dark red, rather light and brittle, but exceedingly durable, and makes valuable lumber.

No. 405. *Sequoia gigantea*, Torr.—Giant Redwood.—California. This is the mammoth or big tree of California, growing in several groves on the western slopes of the Sierra Nevada Mountains, at an altitude of 5,000 to 9,000 feet. The largest trees are over 300 feet high, and over 30 feet in diameter.

No. 406. *Libocedrus decurrens*, Torr.—Bastard Cedar.—California. This is sometimes called Red Cedar, or Post Cedar. It grows in the Sierras of California, at elevations of from 3,000 to 7,000 feet. It is a handsome tree, of low, conical form, tapering fast; 4 to 6 feet diameter at base; but only about 100 feet high. The wood is light and strong, and makes excellent cabinet-work, boxes, &c.

No. 407. *Juniperus Virginiana*, L.—Red Cedar.—Eastern United States. This is the Red Cedar of the eastern portion of the United States. It grows to the height of 30 or 40 feet, generally with a compact conical form. The timber is exceedingly valuable, being light, fine-grained, compact, and durable. The heart-wood is of a handsome dark-red color. It is used for a great variety of ornamental work, and for fence posts is almost imperishable.

No. 408. *Juniperus Virginiana*, var. *Floridana*.—Pencil Cedar; Florida Cedar.—Coast of Florida. This variety, or species, as it is regarded by some, grows on the western coast of Florida. The wood is softer and freer from knots than the common form, and the pencil manufacturers obtain their cedar wood from this source.

No. 409. *Juniperus Virginiana*, var. *montana*.—Rocky Mountain Red Cedar.—Rocky Mountains. A form or variety of Red Cedar found in Colorado and Utah. "In the Wasatch Mountains, Eastern Utah, this tree grows along the cañons containing water throughout the year, and not in dry places. Its form is there quite different from the Red Cedar in the East, being taller and with a looser and less symmetrical top. The people there say that the wood is not durable, and do not use it for fence posts, &c., as is done with the eastern variety."

No. 410. *Juniperus occidentalis*, Hook.—Western Cedar.—Rocky Mountains, California, and Oregon. This is undoubtedly the cedar named by Dr. Hooker *J. occidentalis*. It grows on the east side of the Cascade Mountains in Oregon and also in California. It is of slow growth, seldom attaining more than a foot in diameter and 30 feet in height. The wood is nearly all white, and harder than the Red Cedar.

No. 411. *Juniperus occidentalis*, var. *Texana*.—Rock Cedar.—Texas and westward. This forms extensive woods on rocky soil in Western Texas. The trunk is sometimes over one foot in diameter, yearly rings eccentric. It branches low, and forms almost impenetrable thickets. It is common fuel and fencing timber in Western Texas.—(Lindheimer.)

No. 412. *Juniperus Californicus*, Carr.—Sweet-fruited Juniper.—Southern California. A cedar growing from San Felipe Cañon, in the Cuyamaca Mountains, Southern California, into Arizona and Mexico. It is a dwarf tree, and is very prolific of berries, which are as large as large peas, of a somewhat resinous but sweet taste. The Indians consume large quantities of them for food. The seeds are large, smooth, and free, one or two in each berry.

No. 413. *Juniperus Californicus*, var. *Utahense*.—Western Red Cedar.—Utah and California. This is the prevailing Cedar of the Wasatch Mountains, and ranging into Nevada and Southern California. In Eastern and Central Utah this tree covers the slopes and foot-hills at from 5,000 to 7,000 feet altitude. It is low and spreading at the base, with a dense pyramidal top, light-green foliage, and large rather woody berries, not so nutritious as those of the preceding kind. The wood is extremely durable, and used for fence posts. In Southern Utah the berries are eaten by the Indians. The bark was formerly used by them in manufacturing many articles of clothing.

PALMACEÆ.

No. 414. *Sabal Palmetto*, R. & S.—Cabbage Palmetto.—Coast of North Carolina and southward. The well-known Palmetto tree of the Southern States, from North Carolina to Florida. It grows in sandy soil along the coast, with a stem from 20 to 40 feet high. The leaves are 5 to 8 feet long. "In the Southern States, the wood of this tree, though extremely porous, is preferred to any other for wharves," and when constantly under water is almost imperishable, but, when exposed to be alternately wet and dry in the flowing and ebbing of the tide, it decays as rapidly as other wood.

No. 415. *Brahea edulis*, Wad.—Guadalupe Palm—Guadalupe Island. Guadalupe Island is off the coast of Lower California, 200 miles from San Diego. It is about twenty-six miles long by ten wide. It is owned by a chartered American company for the raising of Angora goats. On the island there is a palm forest, of this species, of several thousand acres in extent. They grow from 12 to 20 feet high, and have a diameter of trunk of 8 to 15 inches. The fruit is about the size of a plum, hanging in clusters, like grapes, 2 feet long, weighing from 30 to 40 pounds, growing from one to four bunches to a tree. The fruit is eagerly eaten by goats.

No. 416. *Pritchardia filamentosa*, Wend.—California Palm.—Southern California. This palm has been in cultivation to some extent for several years, both in Europe and in this country, under the name of *Brahea filamentosa*. It has recently been decided to belong to a different genus (*Pritchardia*). It grows on rocky cañons near San Felipe, some seventy-five miles northeast of San Diego, California. It grows to the height of 50 feet. The fruit is small (as large as peas), black, and pulpy. Though containing little nourishment, they are used as food by the Indians.

No. 417. *Thrinax parviflora*, Sw.—Silver Palmetto.—South Florida. This palm was found last fall by Dr. Chapman in South Florida. The stem is rarely 6 inches in diameter, yet they attain a height of 30 to 40 feet. "It occurs first at Cape Romans and is found sparingly on the mainland southward. It is more common on the keys, but I never heard of it before."—(Chapman.) The wood is quite dense; the berries white.

LILIACEÆ.

No. 418. *Yucca brevifolia*, Eng.—Desert Yucca.—Arizona and Southern Utah. This singular tree grows in the deserts of Arizona and Southern Utah. It is from 10 to 20 feet high, with a trunk sometimes 10 or 12 inches in diameter. It is fibrous in all parts, so that the whole plant may be converted to paper.

No. 419. *Yucca Treculiana*, Carr.—Spanish Bayonet.—Western Texas and westward. Sometimes with a stem over 1 foot diameter and 50 feet high, branching only near the summit, every branch bears a thyrsus of flowers 3 to 4 feet high, each consisting of several hundred white fleshy flowers, shining like porcelain. The fruit is edible, resembling the papaw. The leaves are 2 to 4 feet long, deeply channeled, and pointed by a sharp thorn.—(Dr. Lindheimer.)

DIVISION OF MICROSCOPY.

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The exhibit of the Microscopist, Dr. Thomas Taylor, consists of about 500 water-color drawings, a large proportion of which represents the leading types of the genera of microscopic fungi; another section of the exhibit presents the results of original investigations upon chemical tests for flax, cotton, ramie, silk, wool, hair, and both animal and vegetable cellulose; and still another series, illustrating the principal vegetable starches to the number of about 100 varieties. These drawings present highly magnified views of all these microscopic objects, including those most important in economic mycology, especially the fungi commonly known as molds, so destructive to vegetation. The edible and poisonous mushrooms are distinguished in one class of these drawings.

The importance of the mushroom as an article of diet has never been properly understood in the United States, nor is it generally known how abundant our supply of edible mushrooms is. Many of those popularly supposed to be poisonous are not merely innocuous but highly nutritious, containing, as they do, many of the elements of animal food.

In France, Germany, and Italy the mushroom forms so important a part of the food of the people that one distinguished writer has spoken of it as the "manna of the poor." In Transylvania the oyster mushroom is so abundant, and is so largely used, that tons of it may often be seen in the markets; and in some parts of Germany the Morel mushroom is so popular that the people, finding it to grow best on a soil treated with wood ashes, were accustomed to burn down portions of the forests in order to secure favorable spots for its cultivation—a practice which the Government ultimately found it necessary to interdict. It is hoped that the collection of drawings, which has been made with so much care by Mr. Taylor, will serve to call public attention to the value of the mushroom as an article of food, and at the same time furnish means of discriminating between the poisonous and the edible varieties of the plant.

Particular pains have been taken to represent the last-named class of plants as fully as possible, a number of collectors having been employed for the purpose in various parts of the United States. Among these may be mentioned Professor Peck, of New York, who, in that State alone, gathered specimens of no less than 80 species of mushrooms, including several which are new to science. The specimens furnished by Professor Peck are admirably copied and colored to nature; and there are also a number of excellent photographs, made from specimens furnished by various collectors, representing different genera and species of the same class of plants.

Another series of drawings illustrates the action of pear-tree blight, showing the effects of the chemical changes which take place in the interior structure of the tree under the attacks of the fungus to which this disease is due. The disease of plum and cherry trees, known as "black-knot," is illustrated in a similar manner, some of the drawings exhibiting it as it appears to the naked eye, while others show in detail its distorted, woody structure. The fungus which produces it is also shown at various stages of its growth.

The fungus *Peronospora infestans*, which causes potato-rot, is illustrated in the various stages of its growth. There is also a series of drawings of its "resting-spores," recently discovered by Professor Worthington Smith, and so named from the fact that they remain for months in a stationary condition, or, in other words, *rest* for that time without germinating.

There is an interesting series of drawings representing, as seen through the microscope, the mold of bread, cheese, jellies, &c., and illustrating their habits of growth, a knowledge of which may often be useful in preventing beer or milk from souring, and wine or bread from becoming "ropy."

One of the most curious of the cryptogamic plants is the *Protococcus nivalis*, which we believe was first found by Captain Parry during his northern exploration, and to which was given the name of "red snow," from the fact that it gives its own red color to the surface of the snow on which it grows. This singular little plant is represented by several drawings of exquisite finish and color.

The fibers of hemp, flax, jute, ramie, esparto grass, and Australian flax, as well as wool, silk, calf's hair, and the hair of the Cashmere and Angora goats, are exhibited as seen through the microscope, both in their natural condition and under various forms of chemical action. In the course of his investigations on this subject, Dr. Taylor has discovered a number of new chemical tests by which the presence or absence of certain of these fibers, in every fabric, may be determined. This series of drawings will, therefore, be of considerable interest to manufacturers of textile fabrics, to dealers in that class of goods, and to the Government, which, besides being an extensive purchaser of clothing for the Army and Navy, is largely interested in determining correctly the materials composing the fabrics which pass through the custom-houses.

The investigations to which these drawings relate are still in progress; but the great majority of the drawings relate to the leading families, orders, and genera of cryptogamic plants or fungi, of which by far the greater number are microscopic in size. The latter are often visible to the naked eye when massed together in large numbers, presenting in some cases the appearance of a pigment on the surfaces of the plants upon which they fasten. In such cases the microscope sometimes reveals millions of spores to the square inch. The ravages of these minute vegetable organisms are incredible in their extent. The potato has, at times, been threatened almost with extinction. Grasses have been affected by them, and the cereals throughout large districts have at times suffered blights so serious and often repeated that the farmer has been almost ready to abandon their cultivation in despair. Fields of hops, vineyards and orchards have withered under their blighting touch, and in lower latitudes they have assailed coffee plantations, and groves of orange, lemon, and olive trees, with equally fatal results. Even the lordly forest trees have not in all cases escaped their devastating influence, and at the present moment many of the stately maples in the public grounds of our cities are withering under the insidious attacks of these minute destroyers. In short, there is hardly any department of agriculture, horticulture, or forestry that can claim exemption from their ravages; and the importance of a correct knowledge of their characteristics, modes of propagation and development, and the conditions under which they tend to flourish or decay, can hardly be overestimated. As a contribution toward the dissemination of such knowledge, the collection just described must be regarded as possessing a high practical value.

No large collection of well-executed drawings of cryptogamic plants has heretofore existed in this country; but by the assistance of Dr. M. C. Cooke, of London, and others, Dr. Taylor has supplied the defect in an admirable manner, and has formed a collection which will be of permanent value to mycological science. The drawings, nearly all of which were made from nature for the special purpose to which they are now destined, exhibit a high degree of delicacy and finish.

Mushrooms, in their composition, more nearly resemble flesh than any other vegetable. Dr. Marcet proves that, like animals, they absorb a large quantity of oxygen, and give out in return carbonic acid, hydrogen, or azotic gas. Chemical analysis demonstrates the presence in their structure of the several components of which animal matter is formed, many containing sugar, gum, resin, fungic acid, various salts, albumen, adipocere, and ozmazone, "which last is that principle that gives flavor to meat gravy," according to Dr. Badham.

Fungi are applicable to other than culinary uses, though their most important use is the gastronomic one. To obviate the difficulty arising from the prejudice against the wholesomeness of any mushroom, Mr. Berkeley recommends a good quantity of bread to be eaten with them. He is of opinion that mushrooms are only indigestible when eaten alone or in imprudent quantity. Of course this remark applies equally to any sort of mushroom, though it is made with reference to the one in familiar use.

As an indirect but very important article of diet, the tiny fungus known as yeast stands pre-eminent. It is composed of globular cells which produce other cells with incredible speed, and the interchange of fluids on either side of the membrane is the cause of the fermentation. German yeast is formed of the dried globules. The *Polyporus betulinus* makes very superior razor strops, its substance containing minute crystals; the *Polyporus squamosus* is also good for this purpose, if cut from the tree in autumn, then flattened in a press, rubbed carefully with pumice, cut into slices, and each slice fastened to a wooden stretcher. The *Polyporus fomentarius* forms the amadou of commerce, formerly used only as "German tinder," but now applied by, at any rate, one medical practitioner in sheets to protect the backs of bedridden patients. Gleditsch relates that the poorer inhabitants of Franconia stitch it together and make garments of it. *Polyporus ignarius* is used as snuff in the north of Asia; *Polyporus officinalis* was formerly used as medicine, but is so employed no longer; *Polyporus sulphureus* furnishes a useful dye. *Coprinus atramentarius* may be made into ink; *Amanita muscarius* furnishes poison for vermin, and is an ingredient in some intoxicating liquors. Wood impregnated with the metallic-green spawn of the Peziza is of great value in the delicate inlaid work known as Tunbridge ware. A small fungus belonging to the Ascomycetes class, and known as ergot of rye, furnishes a powerful and useful medicine, though in the hands of the ignorant it is an extremely dangerous poison.

Mr. Berkeley suggests that decayed fungus would form good manure. Such being the case, it would be well worth the trouble to let the laborers' children collect them, and throw them into a heap like dead leaves for leaf-mold. Thus even the poisonous species might be utilized.

But to enable us to turn fungi to the best profit, we must learn to discern the good from the evil, and for this we must cultivate patience and close observation. General rules will not suffice us. The test of a silver spoon will not insure safety. Odor is a good guide; those smelling offensively must be avoided; those with savory or aromatic perfume are generally innocuous; but this test cannot always be trusted, for there are some poisonous and deleterious species which have no smell at all. Color stands for nothing, for the snowy whiteness which in some is the garb of innocence, serves others, as Dr. Badham says, as the mask for guilt. We shall do well to regard all milky fungi with suspicion, and avoid bringing them into our culinary experiments; also, we had better eschew those with a biting or acrid smell or flavor.

We labor under a general impression that all fungi are poisonous except our common mushroom. This is very far from being the fact. Many species now despised form valuable articles of food, and the greater number of the rejected ones are innocuous, or only deleterious in a slight degree.

Mr. Taylor proposes to make a collection of all the known edible mushrooms of the United States, of which descriptions will, from time to time, appear in the Monthly Reports of the Department of Agriculture.

Types of the following families, orders, and genera are exhibited.

Group A, from 1 to 39 inclusive, represents types of the orders and genera of the family Hymenomycetes.

Group B, from 40 to 56, represents types of the order, and genera of the family Gasteromytes.

Group C, from 57 to 119, represents types of the orders and genera of the family Coniomycetes.

Group D, from 120 to 171 inclusive, represents types of the orders and genera of the family Hyphomycetes.

Group E, from 172 to 184 inclusive, is miscellaneous, consisting mostly of types of fungi destructive to vegetation.

172. *Æcidium cornutum*, Pers.
173. Cranberry, long vine, New Jersey.
174. Cranberry, short vine, New Jersey.
175. Various varieties of New Jersey cranberries.
176. *Uredo effusa.*
177. *Æcidium* of the ash.
178. Black knot of the cherry, *Sphæria morbosa.*
179. American grape fungus, *Peronospora vitis viticola* (Berkley & Curtis).
180. Orange leaf, covered with black fungus matter.
181. Exhibits a microscopic view of the fungus on the orange and orange leaf. This fungus destroys the commercial value of the Florida oranges when they are affected by it.
182. Arctic red snow, a cryptogamic plant. (See Micrographic Dictionary.)

183, 184 represent abnormal growths on the foliage of the maple and other trees, formerly supposed to be a fungus, which was named *Erineum*, but they are now considered to be only abnormal growths.

Group F, 185, consists of a series of photographs representing the connective tissue of the mammary glands of a scirrhus cancer. The object of the examination was to detect mycelium or spores of fungoid matter, if present, in the tissue. Portions of the cancer cells were treated with dilute boiling caustic potash until a thin film of it floated on the surface of the liquid. The film was next floated on a microscopic slide, and photographs made from it direct. In these preliminary experiments no fungus matter was observed.

Group G, from 186 to 211 inclusive, represents the results of a series of experiments on textile fabrics, fibers, etc.

Group H, from 212 to 320 inclusive, represents types of the family Ascomycetes.

Group I, from 321 to 324 inclusive, Physomycetes, after Worthington Smith.

Group J, from 1 to 29 inclusive, edible mushrooms, after W. Smith.

Group K, from 30 to 60 inclusive, poisonous mushrooms, after W. Smith.

Group L, from 61 to 66 inclusive, represents drawings relating to pear-tree blight, showing sections, &c., of blighted branches.

Group M, from 66 to 67, represents two branches of the foreign grape affected by the fungus *Oidium Tuckeri*.

Group N, from 87 to 112, photographs of New England fungi.

Group O, 70, represents a photographic view of the starch cells of a boiled potato.

Group P, from 77 to 80 inclusive, represents photographs and drawings of the resting-spores of the potato fungus, lately discovered.

Group Q, from 81 to 86, represents types of vegetable starch granules.

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